

Montgomery County: Anacostia Trash TMDL Monitoring-Related Efforts Technical Memorandum (2013 - 2014)



Prepared For:
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Protection**

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TABLE OF CONTENTS

Project Background	1
Task 1 - Annual Stream-Level Trash Monitoring	2
Task 2 - Stewart-April Lane Storm Drain Inlet Visual Trash Survey	9
Task 3 - Stewart-April Lane ‘Walking’ Trash Survey	14
Task 4 - Stewart-April Lane Bus Stop Survey	18
Recommendations	22
References	23

LIST OF FIGURES

Figure 1 - Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites)	4
Figure 2 - Station Trash Level Rating for Mean Items per 100 Feet (2011 - 2014)	5
Figure 3 - Stream Summary - Percent Total of Top Five Trash Categories	7
Figure 4 - Stream Summary - Total Top Five Trash Categories	7
Figure 5 - Stream Summary - Total Number of Plastic Bags (2011 - 2014)	8
Figure 6 - Stewart-April Lane Tributary Drainage Basin Trash Survey Map	10
Figure 7 - Storm Drain Survey: Top Five Trash Categories	12
Figure 8 - Storm Drain Survey: Number of Plastic Bags by Survey Date	13
Figure 9 - Storm Drain Survey: Number of Styrofoam by Survey Date	13
Figure 10 - Walking Survey: Top Five Trash Categories	16
Figure 11 - Walking Survey: Number of Plastic Bags by Survey Date	17
Figure 12 - Walking Survey: Number of Styrofoam by Survey Date	17
Figure 13 - Bus Stop Survey: Top Five Trash Categories	19
Figure 14 - Bus Stop Survey: Number of Plastic Bags by Survey Date	20
Figure 15 - Bus Stop Survey: Number of Styrofoam by Survey Date	20
Figure 16 - Bus Stop Survey: Properly Disposed Trash Versus Trash/Litter Weights by Survey Date	21

LIST OF TABLES

Table 1 - Anacostia Trash Reduction Workgroup's Stream Trash Survey Index	2
Table 2 - Stream Survey Sampling Results 2014 (N=2)	6
Table 3 - Stream Survey: Average Monthly Trash Accumulation (lbs per Month)	6
Table 4 - Storm Drain Survey: Total Number of Items and Average Number of Items	13
Table 5 - Walking Survey: Total Number of Items and Average Number of Items	15
Table 6 - Bus Stop Survey: Total Number of Items and Average Number of Items	19

Project Background

Per the approved September 2010 Anacostia Watershed Trash TMDL, Montgomery County (the County) is required by MDE/EPA to annually remove or prevent hundreds of tons of trash from entering its tributary streams to the Anacostia River. In order to accomplish this challenging task, it is critical that the County annually assess and estimate both stream and land-based trash levels to provide guidance for cost-effective litter reduction measures.

In 2010, Montgomery County Department of Environmental Protection (MCDEP) contracted with MWCOG to identify stream and land-based trash levels and existing major trash hot spots within the Anacostia Watershed portion of the County. Identification of trash sources and hot spots has enabled the County to better direct limited trash monitoring and reduction measures to where they are most needed. In particular, the Stewart-April Lane tributary drainage in White Oak, Silver Spring has been targeted as a County trash reduction focus catchment area.

As such, five major tasks were completed for this 18 month long project and are as follows:

- Task 1: Annual Stream-Level Trash Monitoring;
- Task 2: Stewart-April Lane Storm Drain Inlet Visual Trash Survey;
- Task 3: Stewart-April Lane 'Walking' Trash Survey;
- Task 4: Stewart-April Lane Bus Stop Survey, and
- Task 5: Technical Memorandum

This technical memorandum will highlight Tasks 1-4 descriptions and their summary findings. Separate appendix documents have been provided for detailed task and data summary information.



Photo 1. Staff counting trash at a large tree fall across the stream.



Photo 2. COG interns categorizing and weighing stream trash



Photo 3. COG staff removing a manhole cover for a storm drain inlet survey.

Task 1: Annual Stream-Level Trash Monitoring

Under this sub-task, COG employed the Anacostia tributary trash surveying protocol, using the MDE-approved field data sheet, to catalogue trash in 15 stream sites (Figure 1; Appendix I, Figure 1). This instream trash survey was performed two times (generally late spring and fall seasons): June 2014 and October 2014 (before leaf fall). At each site, the total number of trash items within a 500 foot long stream reach was recorded and catalogued according to the 20 MDE trash category types. Table 1 represents the 1998 Anacostia Trash Reduction Workgroup's (ATRW) stream trash survey index, which provides a verbal ranking for the number of trash items per hundred feet range.

With the exception of the Paint Branch, Stewart-April Lane site (herein referred to as PBSA100), the 2014 trash monitoring station network remained the same stations monitored in the 2008-2009 Anacostia trash TMDL baseline monitoring effort (MWCOG, 2009 and MDE, 2010). The PBSA100 site is a County trash reduction focus catchment area and is deemed as a priority for trash monitoring. Therefore, PBSA100 was added in 2011 and LPLP205 has been omitted from the survey.

In addition to cataloguing the trash, COG removed and weighed trash items from the upstream 250 feet of the 500 foot long survey reach at five of the 15 sites. In doing so at these 'pick sites', COG generated a reasonable estimate of instream trash accumulation/loading rates between survey periods. Also, in keeping with the 2008-9 survey methodology, precipitation data were obtained from the two nearest weather stations. These were the Reagan National Airport (DCA) and the USDA Beltsville Agricultural Research Center (BARC) (Appendix, Figure 2).

Table 1. Anacostia Trash Reduction Workgroup's Stream Trash Survey Index

Trash Index	
Verbal Ranking	No. Items/100 ft.
None - Very Light	0 - 10.0
Light	10.1 - 25.0
Moderate	25.1 - 50.0
High	> 50.1

Summary of Findings

- Figure 2 summarizes the mean verbal trash rating for 2011-2014 survey period in comparison to the 2008-2009 period. Sites where the trash level rankings increased include:
 - 1) SCLB101 and LPLP109 from light to the moderate level; and
 - 2) SCSC301 from the very light to the light level.
- Sites where trash level rankings decreased include:
 - 1) PBHB210 from the high to the moderate level;
 - 2) NWBP205, and NWBF301 from moderate to light level; and
 - 3) PBPB308 from light to very light level (Figure 2).
- The trash level increase observed at NWNW407D is due to a recent large tree fall across the stream which is acting as a major trash strainer (see Photo 1 on Page 1). PBSA100 continues to have extremely high trash levels.
- As seen in Figure 2, each site's mean verbal trash rating for 2011-2014 survey period is summarized as follows:
 - 1) Four sites = None - Very Light
 - 2) Five sites = Light
 - 3) Five sites = Moderate
 - 4) One site = High

- In 2014, a total of 3,448 items and 56 strainers were counted in two surveys (Table 2). Strainers are natural or anthropogenic features such as log/debris dams, large protruding tree roots or rootwads, gabion baskets, large appliances, shopping carts, etc. Strainers effectively capture and temporarily retain trash, particularly floatables.
- Table 3 shows the monthly trash accumulation rate by weight for the five 'pick sites' for 2014 survey. The highest 2014 rate (7.8 pounds per month) was observed at NWNW407B site, where the large strainer is capturing floatable trash. At PBSA100, the 2014 mean rate is 5.7 pounds per month which is similar to the 2011-2013 mean rate. The lowest rate (0.4 pounds per month) was observed, once again, at the Fairland Regional Park Site (LPLP301A).
- As in the 2008-2009 and 2011-2013 surveys, the 2014 top five trash categories were plastic bags, food packaging, plastic bottles, Styrofoam, and construction debris (Figures 3 and 4). Interestingly, the proportions of plastic bottles and Styrofoam increased from the 2011-2013 surveys to the 2014 surveys.
- Figure 4 shows the total count for the top five trash categories for 2014 (as well as previous survey years). The only trend observed from the original surveys until 2014 is a decrease in plastic bag counts.
- Figure 5 summarizes the plastic bag count for the 2014 survey (as well as previous survey years). A total of 1,203 plastic bags/pieces were counted. The PBSA100 site had the highest plastic bag count.
- In October-November 2014, ER Planning conducted a limited survey at three sites within the Sligo Creek subwatershed. The total approximate linear length surveyed was 300 feet. A total of 149 pieces of trash (both large and small items) were counted at these three non-roadway stream sites. The top categories were stationary (i.e., Paper), glass pieces, polystyrene foam (i.e., Styrofoam packaging chunks and peanuts grouped), plastic packaging and snack packaging. Three of these categories (i.e., polystyrene foam, plastic packaging and snack packaging) are similar to the top five category observed in the 2014 COG stream survey.

Figure 1. Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites)

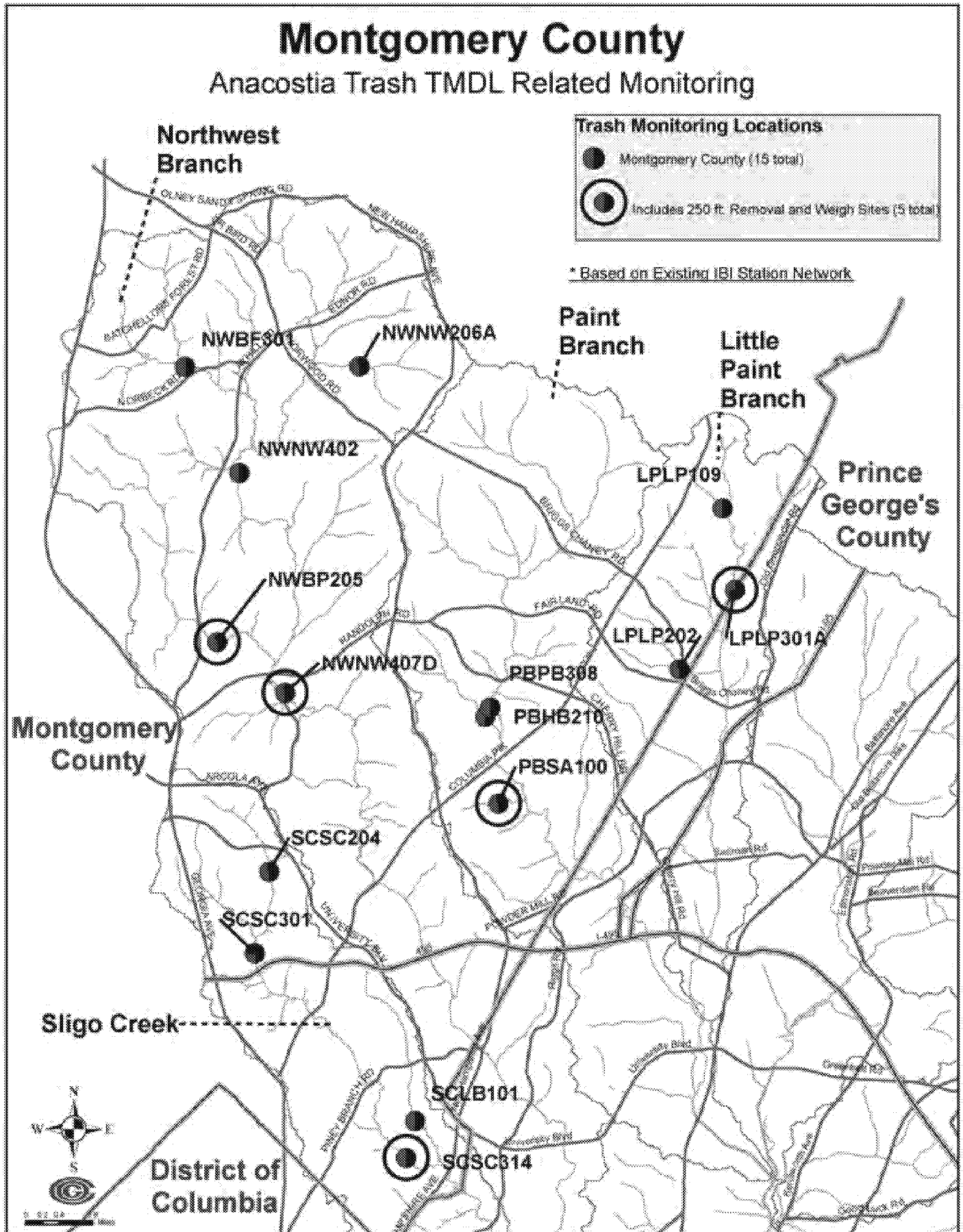


Figure 2. Station Trash Level Rating for Mean Items per 100 Feet (2011 - 2014)

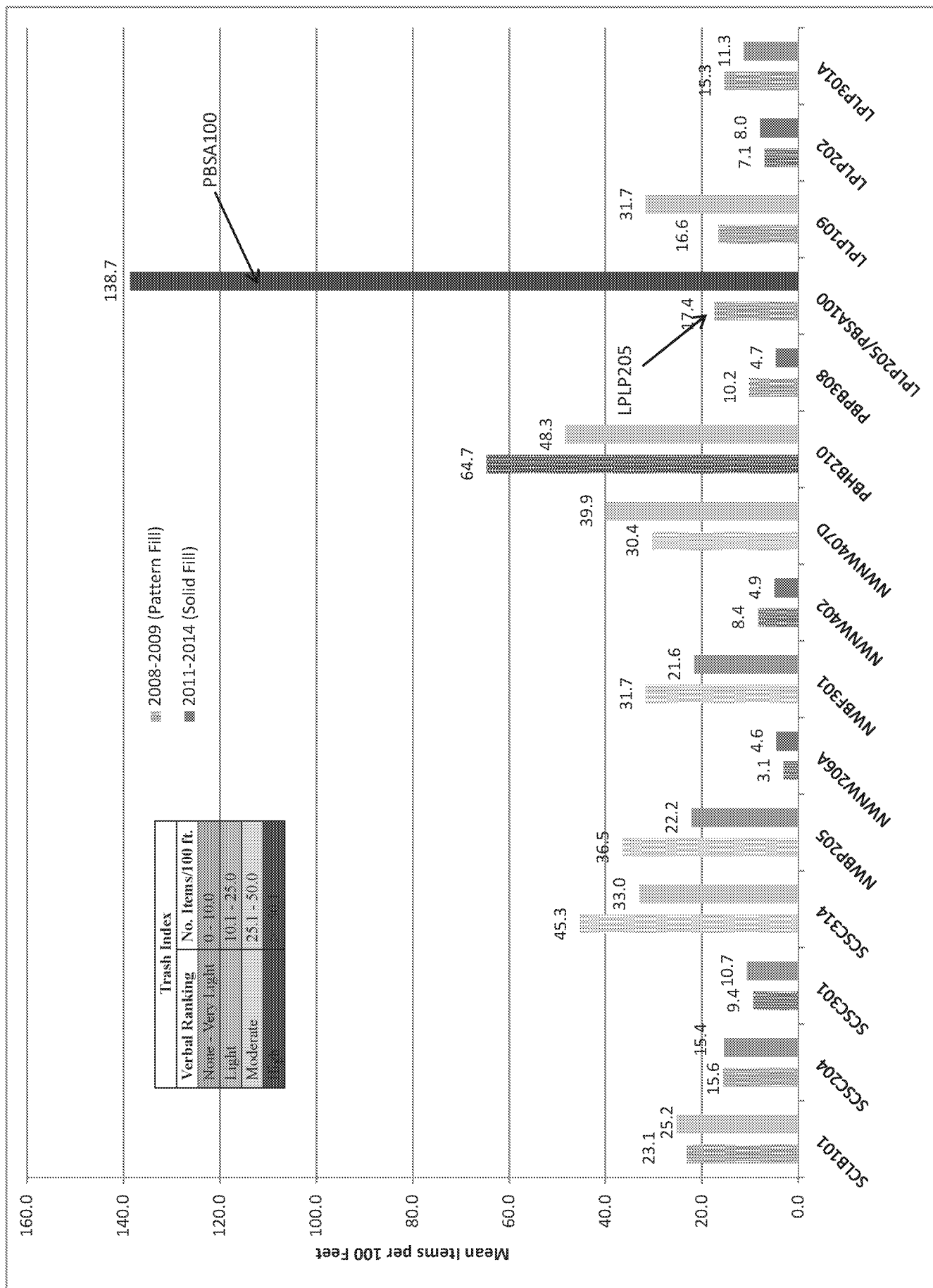


Table 2. Stream Survey Sampling Results 2014 (N=2)

Site Name and Location	Site ID	Drainage Area (mi ²)	Stream Order	Total Number of Trash Items	Mean No. of Trash Items Per 100ft ¹	ARTW Verbal Trash Ranking ²	Top 6 Items ³		Total Number of Strainers	Number of Storm Drain Outfalls Upstream of Survey Site	Dominant land Use	Population	Density per mi ²
							Top 3 Items	Next 3 Items					
Sligo Creek (Long Branch)	SCLB101	0.99	1	154	30.8	Moderate	1,9,13a	4,2,8	1	12	Medium-density Residential	20,202	20,490
Sligo Creek (University Blvd)	SCSC204	0.99	2	193	38.6	Moderate	9,1,4	5,2,13a	6	17	Medium-density Residential	9,055	9,139
Sligo Creek (Forest Glen Road)	SCSC301	2.87	2	128	25.6	Light	1,9,4	2,20,13a	0	41	Medium-density Residential	9,599	3,347
Sligo Creek (Carroll Ave)	SCSC314	7.17	2	259	51.8	High	1,9,4	13a,20,2	0	71	Medium-density Residential	43,119	6,012
Northwest Branch (Batchellors Run)	NWBF301	2.78	2	198	39.6	Moderate	13a,16,20	1,13c,13b	4	20	Open Space	975	361
Northwest Branch (Braynats Nursery Tributary)	NWNB206A	1.35	2	38	7.6	Very Light	13c,16,(4 and 20 tied)	3,6,(1,2,8,9,13a tied)	5	4	Open Space	2,219	1,644
Northwest Branch (Layhill Park)	NWNB402	12.09	3	45	9.0	Very Light	1,2,9	13c,4,(5 and 20 tied)	2	151	Open Space	9,309	770
Northwest Branch (Bel Pre Creek)	NWBP205	3.74	2	180	36.0	Moderate	1,9,4	2,5,20	3	72	Medium-density Residential	16,157	4,318
Northwest Branch (Kemp Mill Rd)	NWNB407D	21.19	3	600	120.0	High	2,5,1	4,9,3	5	3	High-density Residential	40,934	1,932
Paint Branch (Stewart April Ln)	PBSA100	0.34	1	985	197.0	High	1,9,5	2,4,20	8	180	Medium-density Residential	3,780	11,147
Paint Branch (Valley Mill Park)	PBPB308	9.23	3	6	1.2	Very Light	4,9,1	16	6	38	Medium-density Residential	21,704	2,350
Paint Branch (Hollywood Branch)	PBPB210	1.59	2	279	55.8	High	1,9,2	5,4,20	4	9	Medium-density Residential	4,826	3,036
Little Paint Branch (Fairland Pk North)	LPLP109	0.45	1	218	43.6	Moderate	1,2,9	5,8,20	5	29	Open Space	2,883	6,367
Little Paint Branch (Fairland Pk Central)	LPLP301A	2.22	2	78	15.6	Light	1,2,9	5,8,20	4	48	High-density Residential	2,883	1,299
Little Paint Branch (Tanglewood Tributary)	LPLP202	0.92	2	67	17.4	Light	1,2,5	9,4,20	3	31	Open Space	9,484	10,279

Table 3. Stream Survey: Average Monthly Trash Accumulation (lbs per Month)

Sub-Watershed	Site Name	Site ID	Monthly Trash Accumulation (lbs per Month)										Average Monthly Accumulation Rate	Average Annual Accumulation Rate (lbs per Year)		
			Summer 2011		Fall 2011		Summer 2012		Fall 2012		Summer 2013				Fall 2013	
			Summer 2011	Fall 2011	Summer 2012	Fall 2012	Summer 2013	Fall 2013	Summer 2014	Fall 2014						
Sligo Creek	Carroll Avenue	SCSC314	10	33	11	11	10	12	12	12	1.1	1.1	1.4	146		
Northwest Branch	Bel Pre Creek	NWBP205	60	11	13	13	16	09	13	24	08	0.8	1.9	227		
Northwest Branch	Kemp Mill Road	NWNBW407D	22	12	16	16	03	10	13	55	7.8	5.5	2.6	308		
Paint Branch	Stewart April Lane	PBSA100	91	44	38	38	56	53	62	63	51	5.1	5.7	646		
Little Paint Branch	Fairland Regional Park (Central)	LPLP301A	16	11	02	01	03	03	13	05	02	0.2	0.7	68		

Figure 3. Stream Summary - Percent Total of Top Five Trash Categories

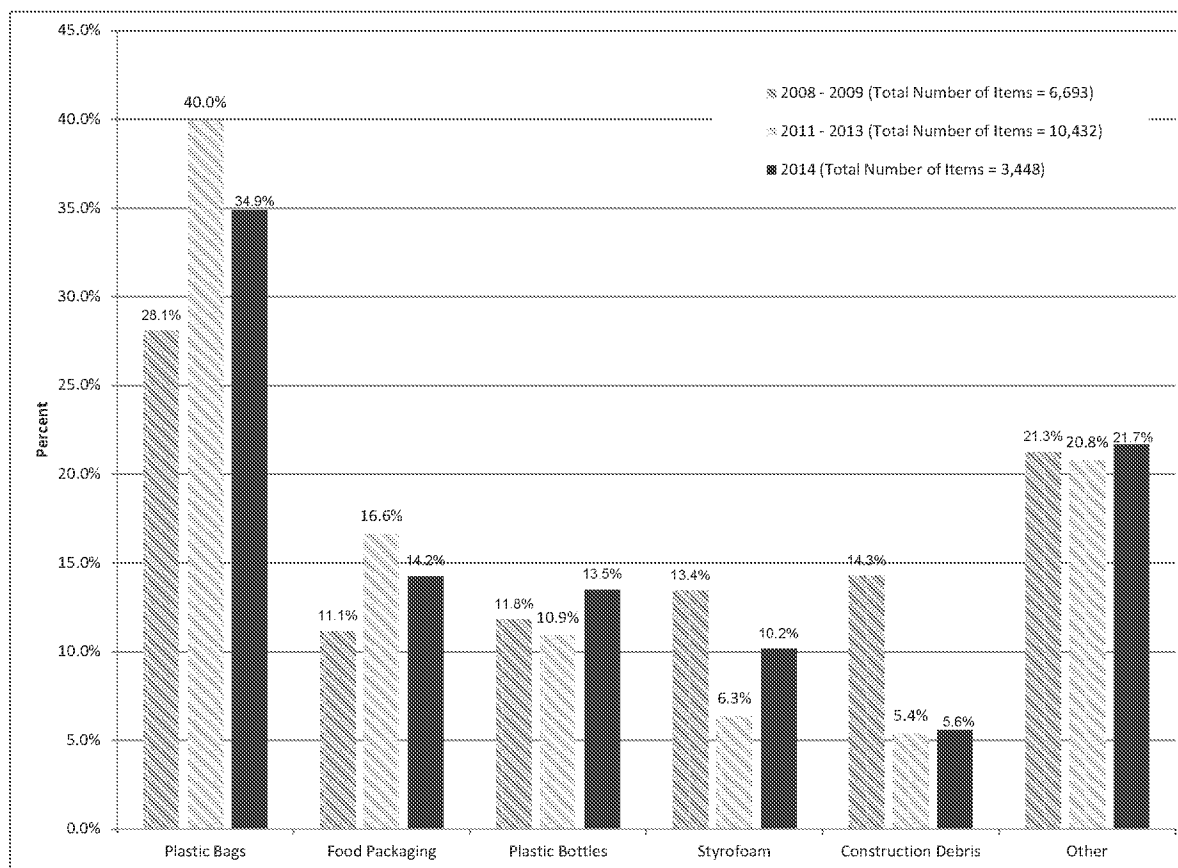


Figure 4. Stream Summary - Total Top Five Trash Categories

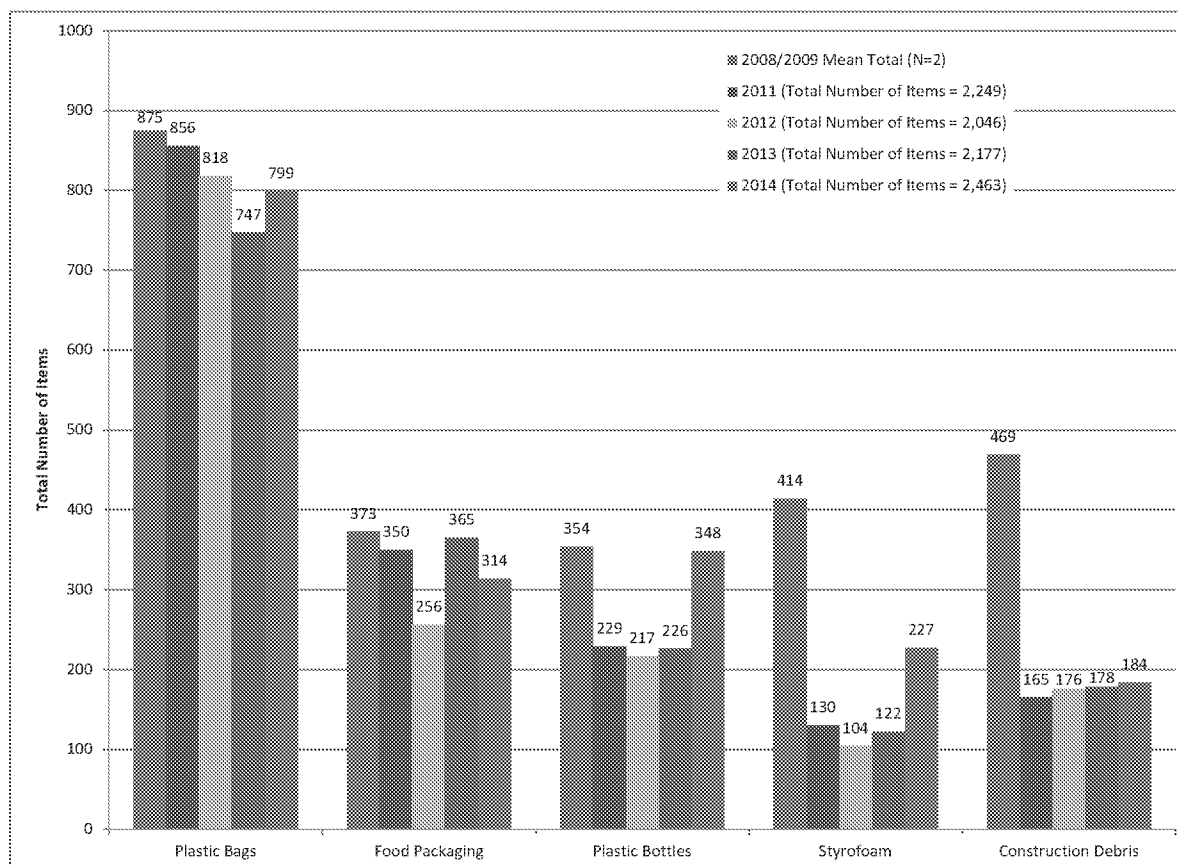
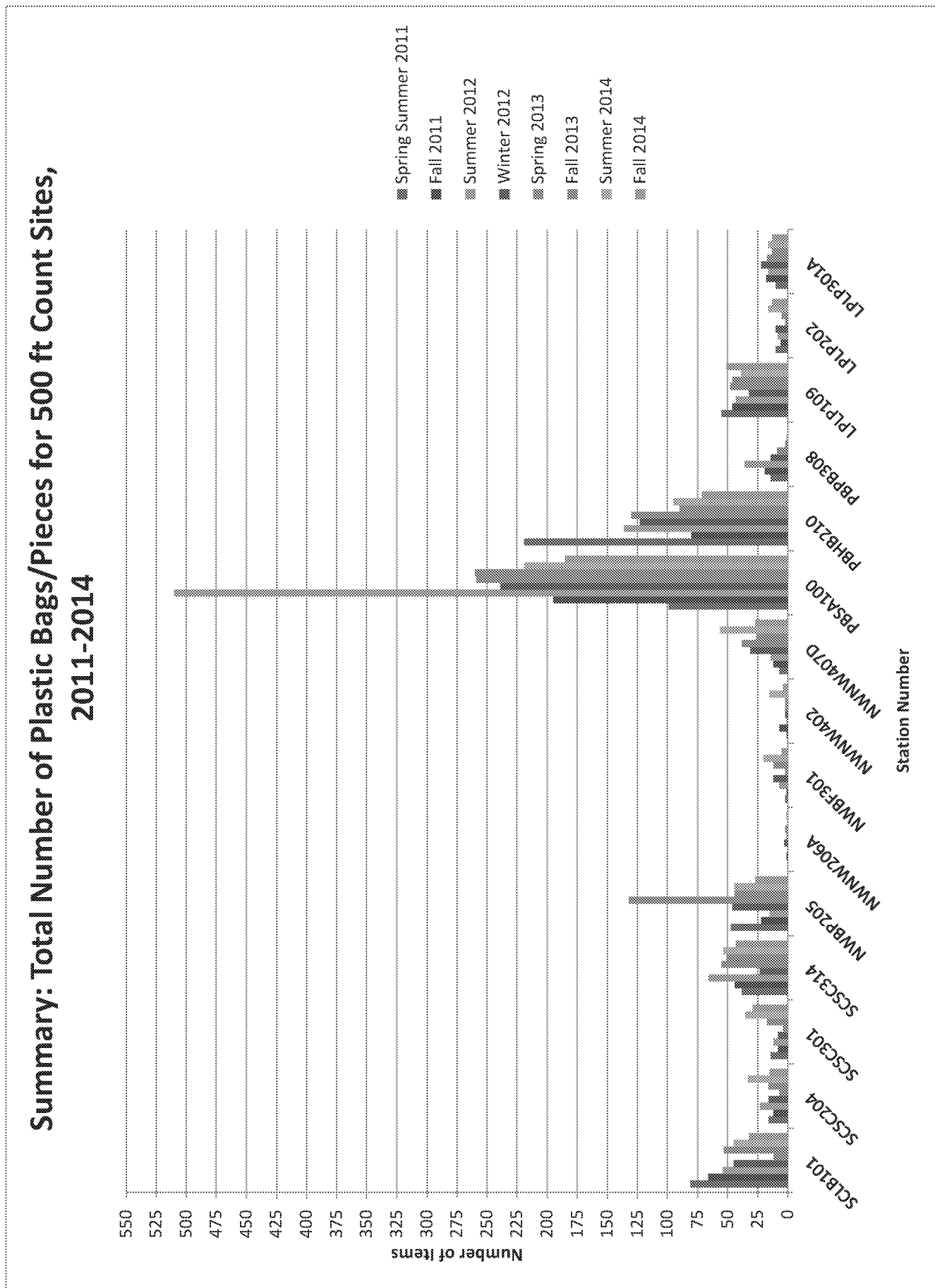


Figure 5. Stream Summary - Total Number of Plastic Bags (2011 - 2014)



Task 2: Stewart-April Lane Storm Drain Inlet Visual Trash Survey

In order to evaluate the Stewart-April Lane storm drain system focusing on trash conveyance, COG developed a trash/litter surveying protocol to conduct at 22 geographically representative storm drain inlets. Figure 6 highlights the storm drain survey location (as well as the Walk and Bus Stop trash survey locations). This land-based storm drain inlet protocol was field tested and approved by MCDEP in September 2012. COG staff conducted 16 storm drain inlet survey dates beginning in July 2013 and ending in April 2015. The complete survey protocol can be found in Appendix I, Figure 3. Briefly, at each inlet, COG staff temporarily removed the manhole cover to allow for visual inspection and associated counting of trash items in the storm drain inlet. The trash types, total number of items, and relative overall trash level (e.g., High, Moderate, Light or None) present were documented. The total number of trash items were recorded and catalogued according to the 20 MDE trash category types. In addition, all storm drain inlet inspection surveys were performed a minimum of 3-4 days after a significant rain event (i.e., > 0.20 inches over 24 hours).

As part of the survey form (Appendix I, Figure 4), the presence of high amounts of leaf litter, baseflow, the overall physical integrity/condition of the interior of the storm drain inlet, as well as other conditions of interest, were recorded. It should be noted that the inlet surveys (along with the Walking and Bus Stop surveys) were separated into seven groups based on general proximity to each other (Figure 6).

Summary of Findings:

- Table 4 summarizes the total items counted in storm drains during the 2013-2015 survey period, as well as the mean number of trash items for each Group. Group 1 Storm drain inlets had the most trash, which is not surprising, as they are located in a major, high use WMATA bus transfer area. Groups 4 and 5 have next highest trash items. These storm drain inlets are located along Stewart Lane where curbside parking has been observed at moderate to high levels (Photo 4). Trash/litter associated to these sites include food packaging, tissue paper and plastic beverage bottles
- Group 2 trash items are very low (e.g., 50 total items). These are recently installed storm drain inlets (Photo 5) as part of the Lockwood Drive and Stewart lane green streets project. Minimal foot traffic along the sidewalk and little curbside parking has been observed adjacent to these inlet areas.
- Group 6 trash items are also very low (e.g., 44 total items). This is an grassy area inlet drain. Trash is generally not well conveyed to this drain and remain adjacent to the road pavement.
- The top five trash categories seen in storm drains were food packaging, paper, plastic bottles, plastic bags, and Styrofoam (Figure 7).
- Total counts of plastic bags/pieces ranged from a low of 11 on 11/25/2013 to a high of 45 on 9/29/2014. The average count per survey date was 26.4 plastic bags. No observable trend (increase or decrease) is seen in plastic bag counts over the survey period (Figure 8).
- A total of 321 Styrofoam pieces were counted during the 2013- 2014 survey. Counts ranged from a low of 8 on September and October 2013 to a high of 38 on March 2014. The average count per survey date was 20.1 pieces. No observable trend (increase or decrease) is seen in Styrofoam counts over the survey period (Figure 9).
- The approximate total trash weight for the 2013-2014 storm drain inlet survey period is 379.3 pounds. This estimation (as well as those for walking and bus stop surveys) is based upon per unit wet weight approximations for each trash category from stream surveys.
- As documented, the storm drain inlet grates did capture more trash and prevented it from moving downstream. However, it was observed that during fall/winter season, high organic debris load and trash may build up (Photo 6). During high intensity rainfall, some trash and debris may fill the grate, causing trash and debris to overflow into the inlet pipe and ultimately conveyed, the open stream channel.

Figure 6. Stewart-April Lane Tributary Drainage Basin Trash Survey Map

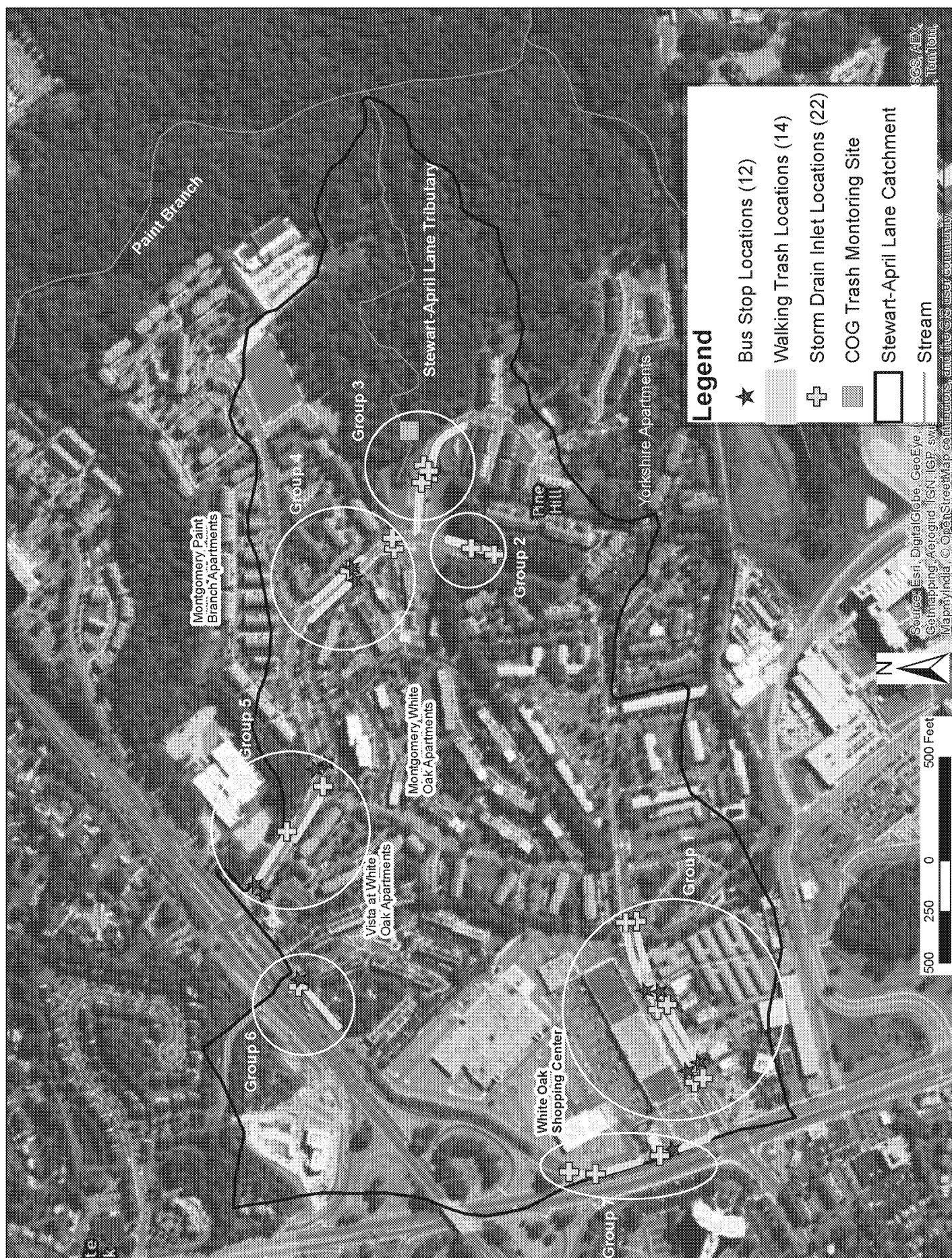


Table 4. Storm Drain Survey: Summary - Total Number of Items and Average Number of Items

Group	Number of Inlets	Adjacent Land Use	Total Number of Surveys	Total Number of Items	Mean Number of Items/Inlet	Mean Number of Items/Survey	Mean Number of Items/Survey Range		Top 3 Items ¹
							Minimum	Maximum	
1	6	Commercial	16	2,489	415	156	103	264	9,6,2
2	2	Residential		50	25	3	0	8	
3	4	Residential		144	36	9	2	28	
4	3	Residential		588	196	37	12	99	
5	2	Residential		578	289	36	15	58	
6	1	Residential		44	44	3	0	8	
7	3	Commercial		467	156	29	0	50	

¹Trash categories:

1) Plastic Bags 2) Plastic Bottles; 3) Glass Bottles; 4) Aluminum Cans; 5) Styrofoam (cups, packaging etc.); 6) Paper (newspaper, magazines, etc.); 7) Cardboard; 8) Cloth/Clothing/Carpeting; 9) Food Packaging; 10) Auto (a) Oil Quart Containers; b) Oil Filters Antifreeze; c) Containers d) Body Parts Large >1ft²; and e) Body Parts Small <1ft²; 11) Car Batteries; 12) Tires (Cars, Truck); 13) Construction Debris: (a) Bricks (>1/2 brick); b) Concrete; c) Lumber; and d) Misc. (e.g. dry wall, etc)); 14. Appliances; 15) Wooden Pallets; 16) Metal (Drums, Cans, Pipes, etc.); 17) Shopping Carts; 18) Toiletries/Drug Containers; 19) Sports Equipment/Toys; and 20) Miscellaneous.



Photo 4. Stewart Lane curbside mid-day parking conditions.

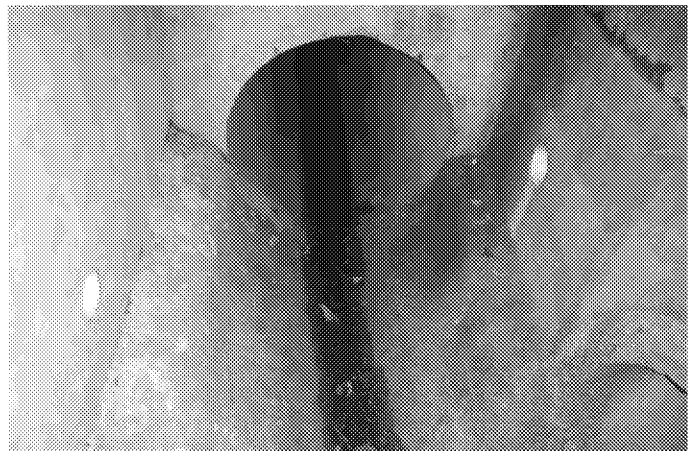


Photo 5. Lockwood Drive storm drain inlet box - very light trash condition (Group 2)



Photo 6. Stewart Lane and Lockwood Drive storm drain trash grate catching leaves and trash (Winter 2014)

Figure 7. Storm Drain Survey: Top Five Trash Categories

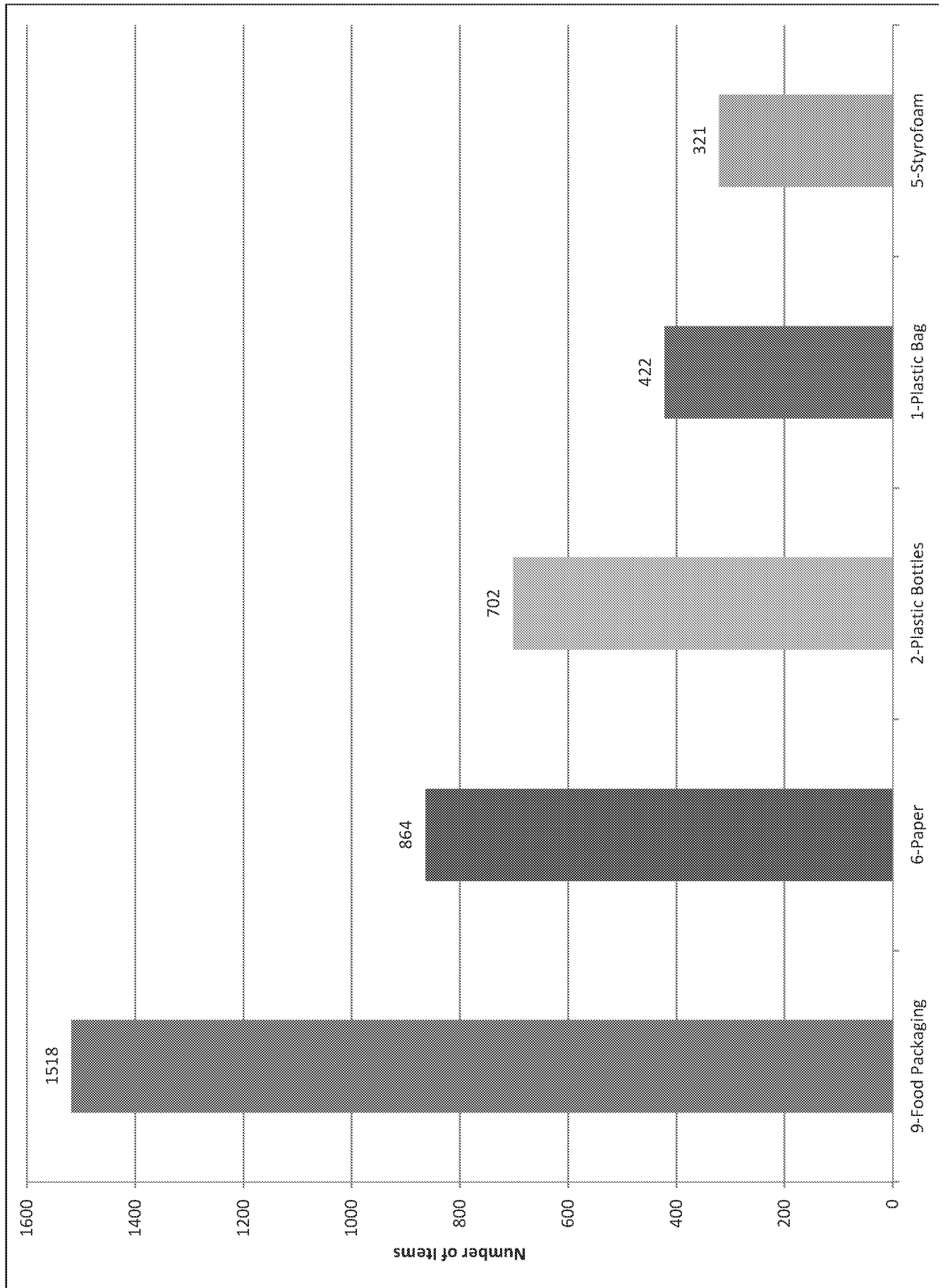


Figure 8. Storm Drain Survey: Number of Plastic Bags by Survey Date

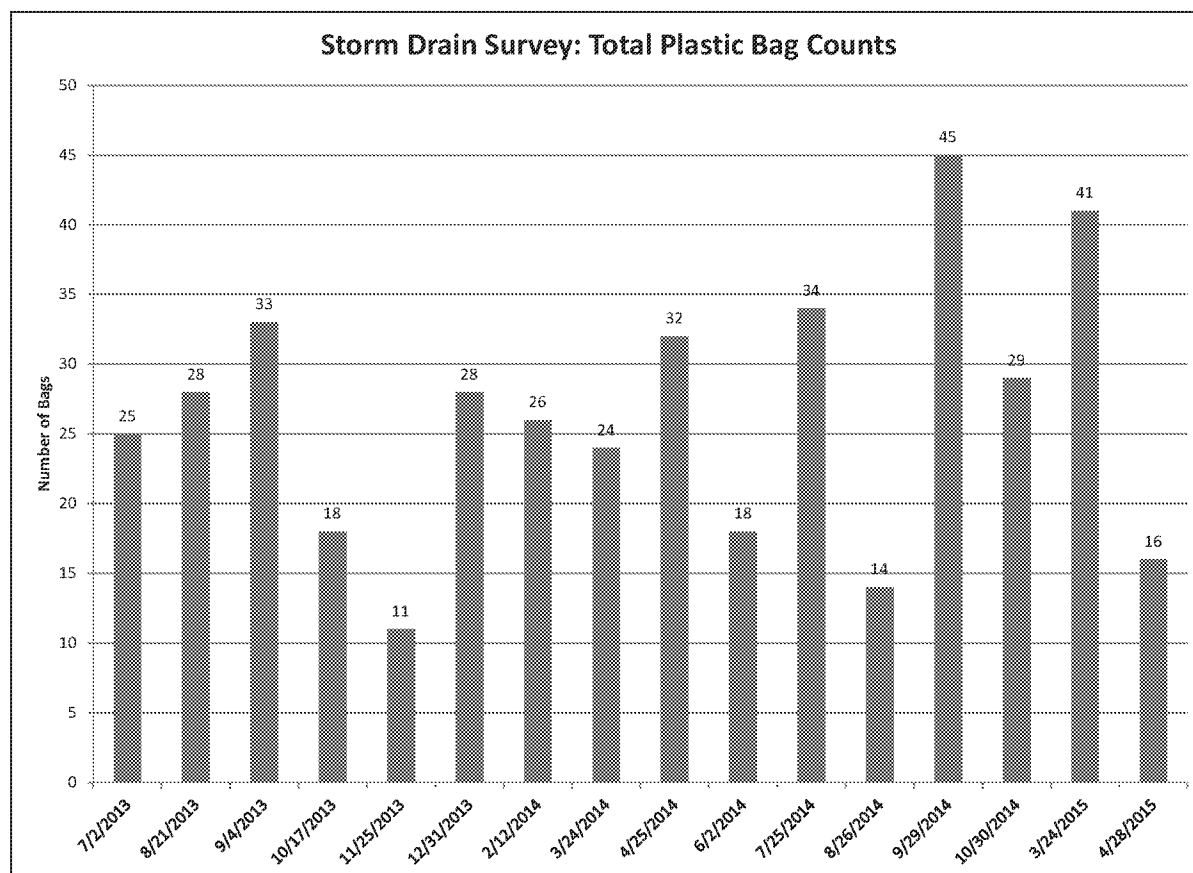
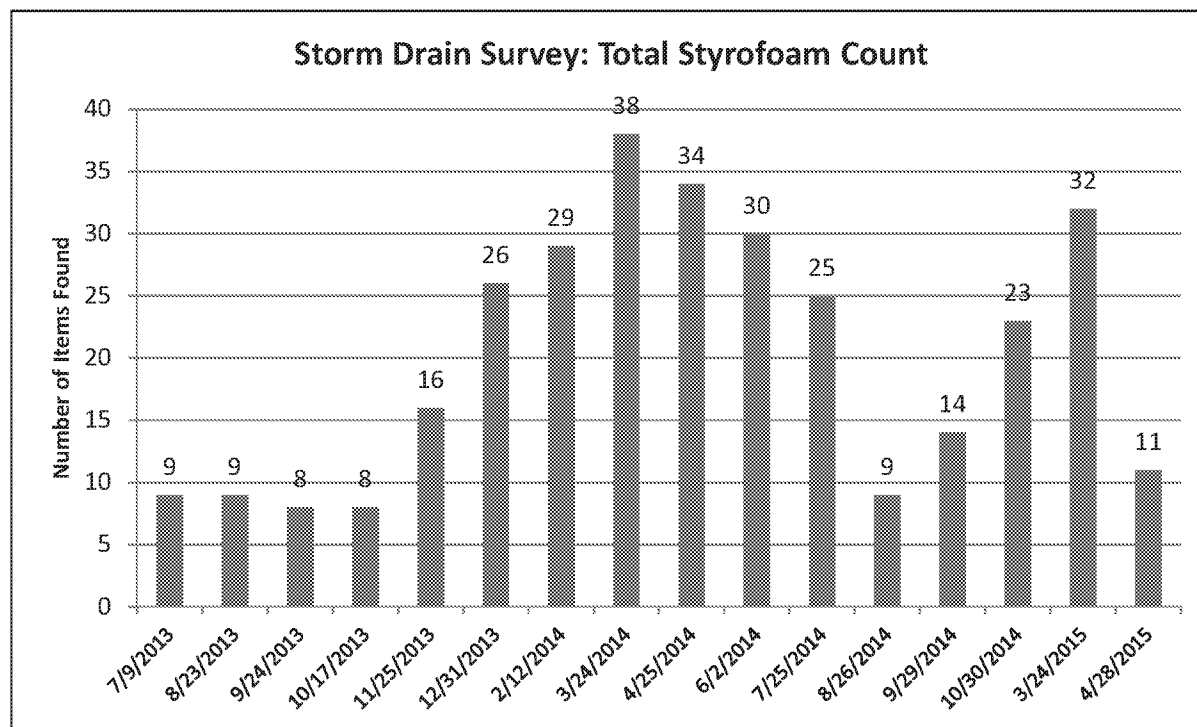


Figure 9. Storm Drain Survey: Number of Styrofoam by Survey Date



Task 3: Stewart-April Lane 'Walking' Trash Survey

To provide a better understanding of the trash/litter accumulation from the land based areas, COG staff performed 300-foot long roadside walking trash surveys at 14 geographically representative locations within the Stewart-April Lane Tributary drainage basin (Appendix I, Figure 5). The survey methodology (Appendix 1, Figure 6) was identical to that previously used by COG in its roadside walking surveys (i.e., photo document, count, catalogue, removing and weighing all trash items within 10 feet of the road gutter pan). The surveys included portions of the recently installed stormwater bioretention/bioswale systems along both Lockwood Drive and Stewart Lane. Relative trash levels and associated weights were summarized. As with the storm drain surveys, all walking surveys occurred a minimum of 3-4 days after any significant rainfall events.

Summary of Findings

- Table 5 summarizes the total items counted in walking surveys during the 2013-2014 survey period, as well as total and mean number of trash items within each group. As expected, the walking surveys in Group 1 and Group 7 had the highest trash counts, 2,292 and 1,224 respectively.
- Surprisingly, the walk survey for Group 6 had the highest mean number of items per 100 ft, at 14.5. This survey was conducted along Old Columbia Pike, a section of road that does not have a curb and gutter system.
- Groups 1 and 7 had the next highest mean number of items per 100 ft at 11.9 and 12.8, respectively (Table 5). These surveys are located along a high use WMATA bus transfer and roadway areas.
- The top five trash categories observed in the walk surveys were food packaging, paper, miscellaneous, plastic bottles, and Styrofoam (Figure 10). Food packaging, paper, and plastic bottles were also in the top five trash categories in our storm drain surveys. For this survey, the plastic bags category placed eighth.
- Plastic bag counts ranged from a low of 2 on 10/20/2014 to a high of 24 on 4/25/2014 (Figure 11). There does not appear to be any seasonal trend in plastic bag counts over the survey period.
- A total of 112 Styrofoam pieces were counted during the 2013-2014 survey period. It ranged from a low of 0 on 4/28/2015 to a high of 20 on 3/24/2014. There does not appear to be any seasonal trend in Styrofoam counts over the survey period (Figure 12).
- The approximate total trash weight for the 2013-2014 'Walking' survey period is 627.9 pounds. This estimation (as well as those for walking and bus stop surveys) is based upon per unit wet weight approximations for each trash category from stream surveys.
- High levels of trash and litter accumulation and overflowing dumpster conditions were often observed along and behind commercial properties located on the eastbound side of Lockwood Drive (Photos 9 and 10). Overflowing dumpster conditions were reported to MCDEP staff subsequent to field surveys.

Table 5. Walking Survey: Summary - Total Number of Items and Average Number of Items

Group	Walk Survey ID	Number of Survey Dates	Total Items to Date	Mean Number of Items/Survey	Mean Items Per 100ft*	Top 3 Items Overall
1	W-LWEB1	16	602	37.6	12.5	9,6,20
	W-LWWB1		359	22.4	7.5	
	W-LWEB2		805	50.3	16.8	
	W-LWWB2		526	32.9	11.0	
	Subtotal		2,292	143.3	11.9	
2	W-LWNB		329	20.6	6.9	
3	W-STLN1		81	5.1	1.7	
	W-STLN2		164	10.3	3.4	
	Subtotal		245	15.3	2.6	
4	W-STNWB		81	5.1	1.7	
	W-STSEB		252	15.8	5.3	
	Subtotal		333	20.8	3.5	
5	W-STEB		354	22.1	7.4	
	W-STWB		513	32.1	10.7	
	Subtotal		867	54.2	9.0	
6	W-OCP		695	43.4	14.5	
7	W-NH1		434	27.1	9.0	
	W-NH2		790	49.4	16.5	
	Subtotal		1,224	76.5	12.8	

* COG staff performed 300-foot long roadside walking trash surveys

¹Trash categories:

1) Plastic Bags 2) Plastic Bottles; 3) Glass Bottles; 4) Aluminum Cans; 5) Styrofoam (cups, packaging etc.); 6) Paper (newspaper, magazines, etc.); 7) Cardboard; 8) Cloth/Clothing/Carpeting; 9) Food Packaging; 10) Auto (a) Oil Quart Containers; b) Oil Filters Antifreeze; c) Containers d) Body Parts Large >1ft²; and e) Body Parts Small <1ft²; 11) Car Batteries; 12) Tires (Cars, Truck); 13) Construction Debris: (a) Bricks (>1/2 brick); b) Concrete; c) Lumber; and d) Misc. (e.g. dry wall, etc)); 14. Appliances; 15) Wooden Pallets; 16) Metal (Drums, Cans, Pipes, etc.); 17) Shopping Carts; 18) Toiletries/Drug Containers; 19) Sports Equipment/Toys; and 20) Miscellaneous.



Photo 7. Dumpster condition and litter hot spot area behind commercial properties on Lockwood Drive.



Photo 8. Overflowing dumpster condition behind commercial properties on Lockwood Drive.

Figure 10. Walking Survey: Top Five Trash Categories

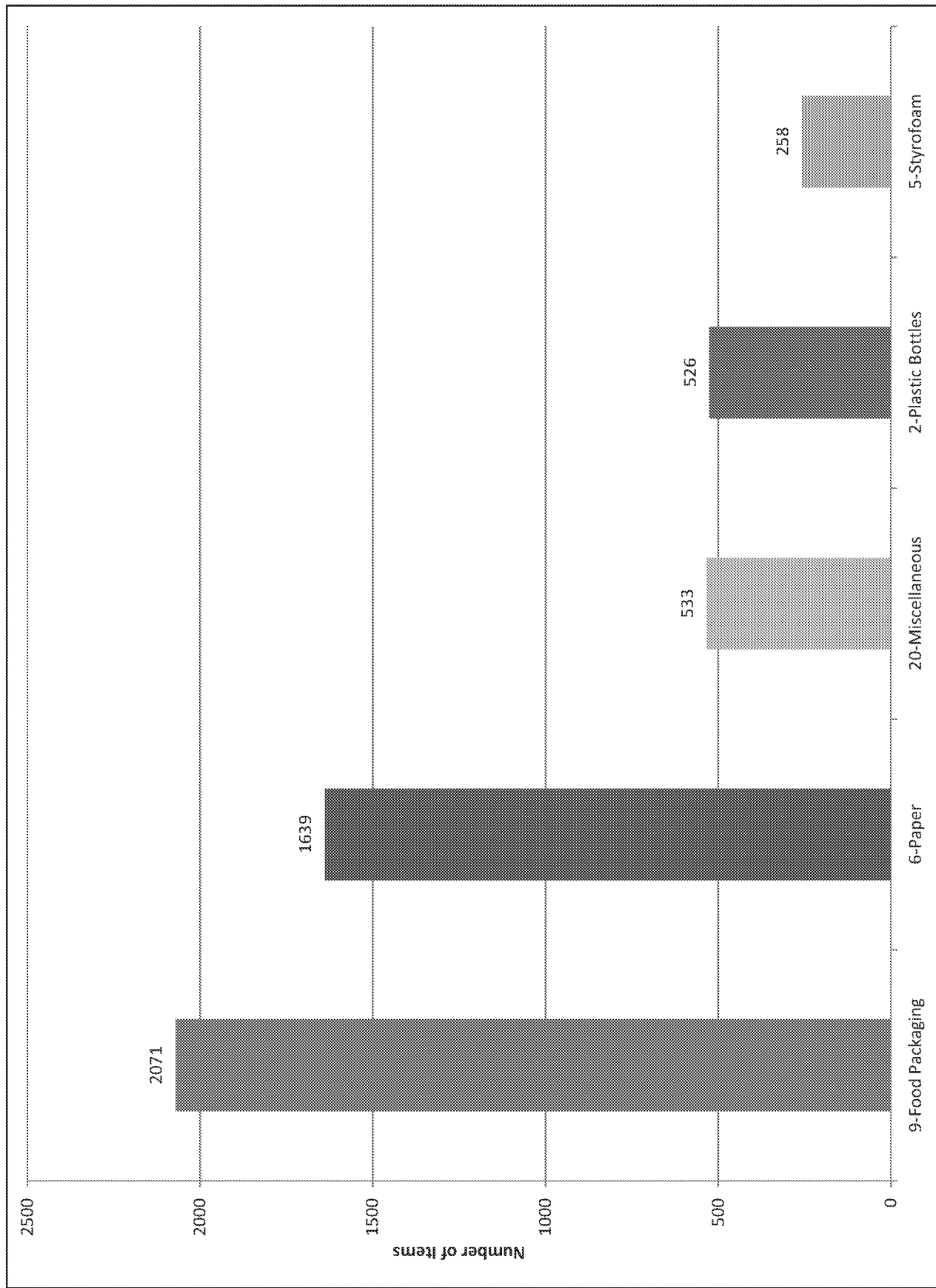


Figure 11. Walking Survey: Number of Plastic Bags by Survey Date

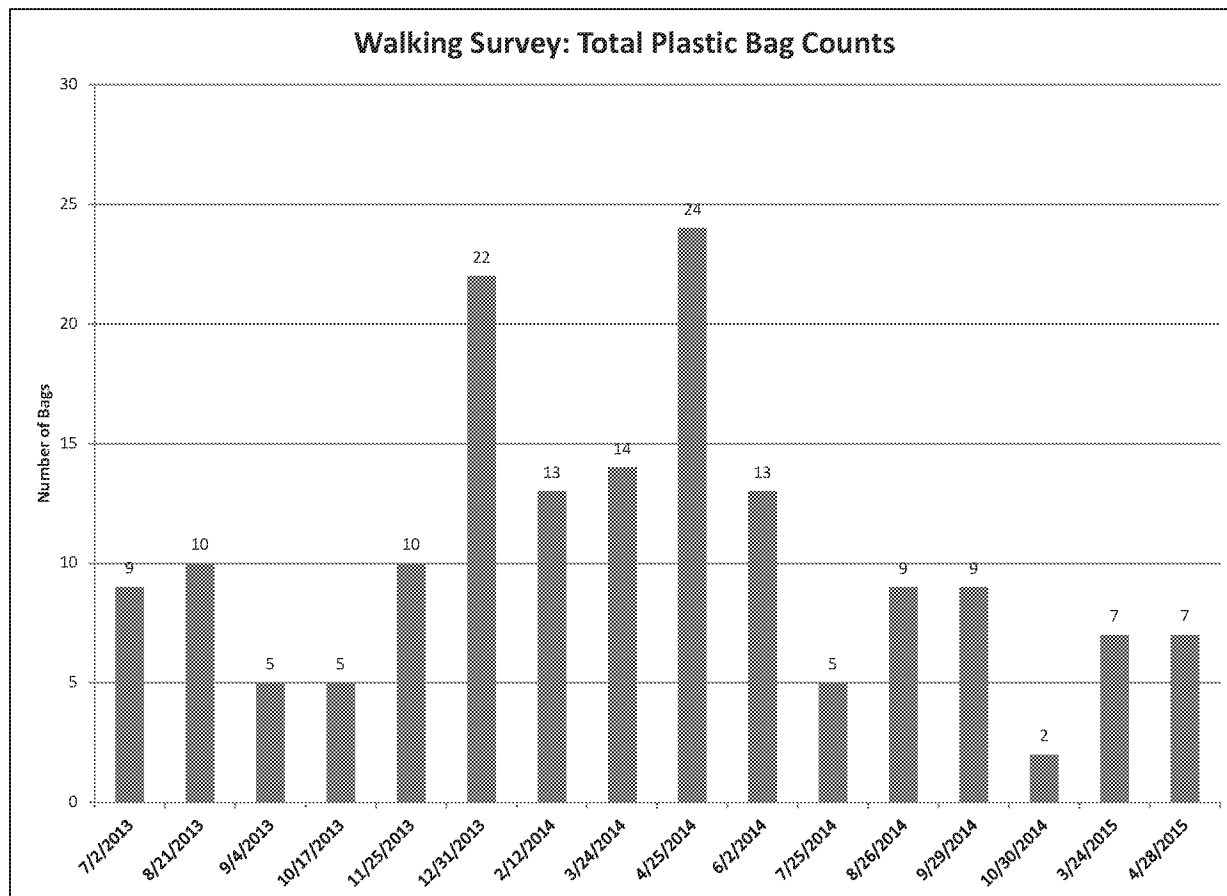
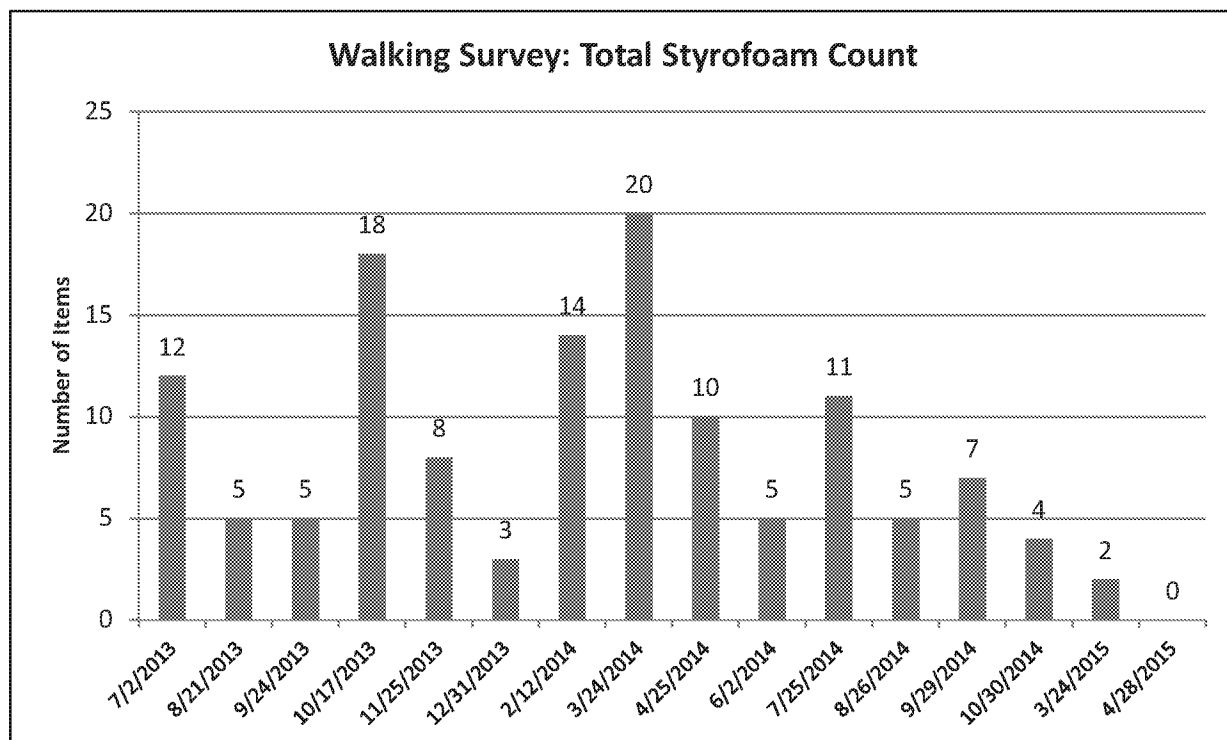


Figure 12. Walking Survey: Number of Styrofoam by Survey Date



Task 4: Stewart-April Lane Bus Stop Survey

Under this sub-task, COG staff performed 50-foot long roadside surveys at 12 bus stops in the Stewart-April Tributary subwatershed (Figure 6). Using the center of each bus stop as the midpoint of the survey, COG staff counted and categorized each piece of trash in a ten foot wide area from the top of the street curb. With the exception of two Lockwood Drive bus stop surveys, the total bus stop survey area equaled 500 ft². The two surveys on Lockwood Drive were approximately 100 feet long each and each totaled 1,000 ft².

In addition, the number of trash receptacles at each bus stop was noted in each survey length. On each survey date, COG staff recorded the relative trash levels in each can and recorded the weight of each receptacles (plus trash inside it) using a hanging scale. All trash not inside the trash receptacle was counted and categorized as part of the area survey. As with storm drain and walking surveys, all bus stop surveys occurred a minimum of 3-4 days after any significant rainfall events. Complete survey protocol can be found in Appendix I, Figure 7 and the associated bus stop survey data sheet can be found in Appendix I, Figure 8.

Summary of Findings

- Table 6 summarizes the total items counted in bus stop surveys during the 2013-2014 survey period, as well as total and mean number of trash items per site within each group. Bus stops in Group 1 and Group 7 had the highest trash mean number of items per 100 feet at 44.1 and 59.6 respectively. As previously mentioned, both groups are located in high use WMATA bus transfer and major roadway areas.
- The top five trash categories seen in bus stop surveys were food packaging, paper, miscellaneous, plastic bottles, and aluminum cans (Figure 13). Food packaging and paper comprised approximately 80 percent of these top five items. Generally, small pieces of candy/gum wrappers (e.g., food packaging item) and newspaper and facial tissues (e.g., paper) were observed around the bus shelter area. It should be noted that food packaging, paper, miscellaneous and plastic bottles were also observed in the walk survey's top trash categories.
- Plastic bag counts ranged from a low of two on 8/26/2014 and 3/24/2014 to a high of 19 on 6/2/2014. There does not appear to be any trend in plastic bag counts over the survey period (Figure 14).
- A total of 54 Styrofoam pieces were counted during the 2013-2014 survey period. It ranged from a low of zero on multiple dates to a high of six September 2013 and August 2014. There does not appear to be any seasonal trend in Styrofoam counts over the survey period (Figure 15).
- Figure 16 summarizes total weights of properly disposed trash versus trash/litter at bus stops by survey dates. As expected, with the exception of August 2013 and February 2014; trash/litter weight is always less than the properly disposed trash. Generally, trash receptacles at bus stops are being used, thereby reducing the trash/litter that otherwise would enter the April-Stewart Lane storm drain system.
- The approximate total trash/litter weight for the 2013-2014 Bus Stop survey period is 366.9 pounds. This estimation (as well as those for walking and bus stop surveys) is based upon per unit wet weight approximations for each trash category from stream surveys.
- Many of the bus stops in the commercial area (Lockwood Drive and New Hampshire Avenue) frequently had overflowing trash cans. Most bus stops in the residential neighborhoods had relatively low levels of trash.

Table 6. Bus Stop Survey: Total Number of Items and Average Number of Items

Group	Number of Bus Stop(s)	Total Number of Surveys	Total Number of Items	Mean Number of per 100 ft	Mean Number of Items/100 ft²	Top 3 Items Overall
1	4	16	1,420	39.0	4.4	9,6,20
2	0		No Bus Stops To Survey			
3	2		193	12.1	1.2	
4	2		596	37.3	3.7	
5	1		596	37.3	3.7	
6	1		229	28.6	2.9	
7	1		477	59.6	6.0	

¹Trash categories:

1) Plastic Bags 2) Plastic Bottles; 3) Glass Bottles; 4) Aluminum Cans; 5) Styrofoam (cups, packaging etc.); 6) Paper (newspaper, magazines, etc.); 7) Cardboard; 8) Cloth/Clothing/Carpeting; 9) Food Packaging; 10) Auto (a) Oil Quart Containers; b) Oil Filters Antifreeze; c) Containers d) Body Parts Large >1ft²; and e) Body Parts Small <1ft²; 11) Car Batteries; 12) Tires (Cars, Truck); 13) Construction Debris: (a) Bricks (>1/2 brick); b) Concrete; c) Lumber; and d) Misc. (e.g. dry wall, etc)); 14. Appliances; 15) Wooden Pallets; 16) Metal (Drums, Cans, Pipes, etc.); 17) Shopping Carts; 18) Toiletries/Drug Containers; 19) Sports Equipment/Toys; and 20) Miscellaneous.

Figure 13. Bus Stop Survey: Top Five Trash Categories

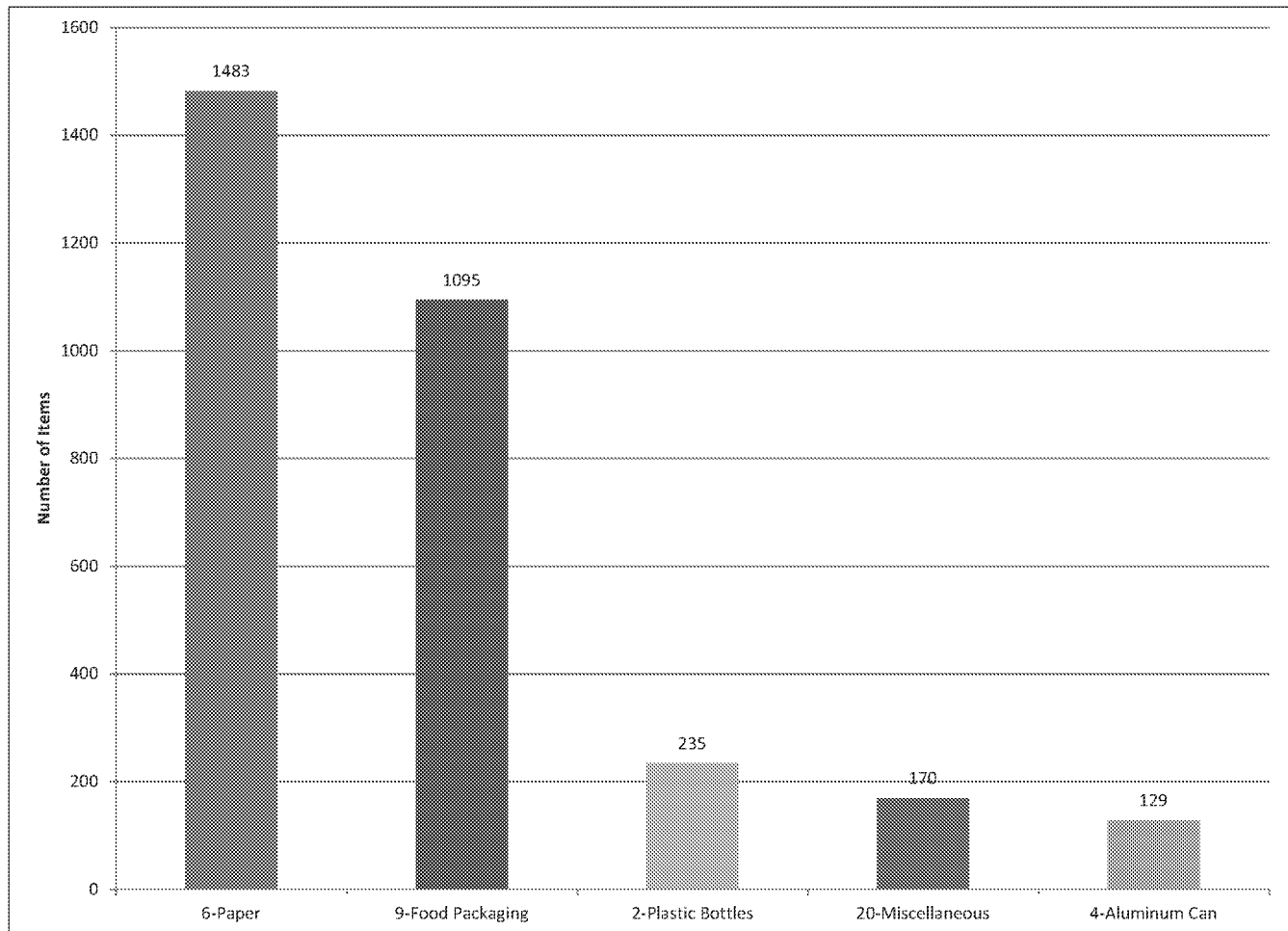


Figure 14. Bus Stop Survey: Number of Plastic Bags by Survey Date

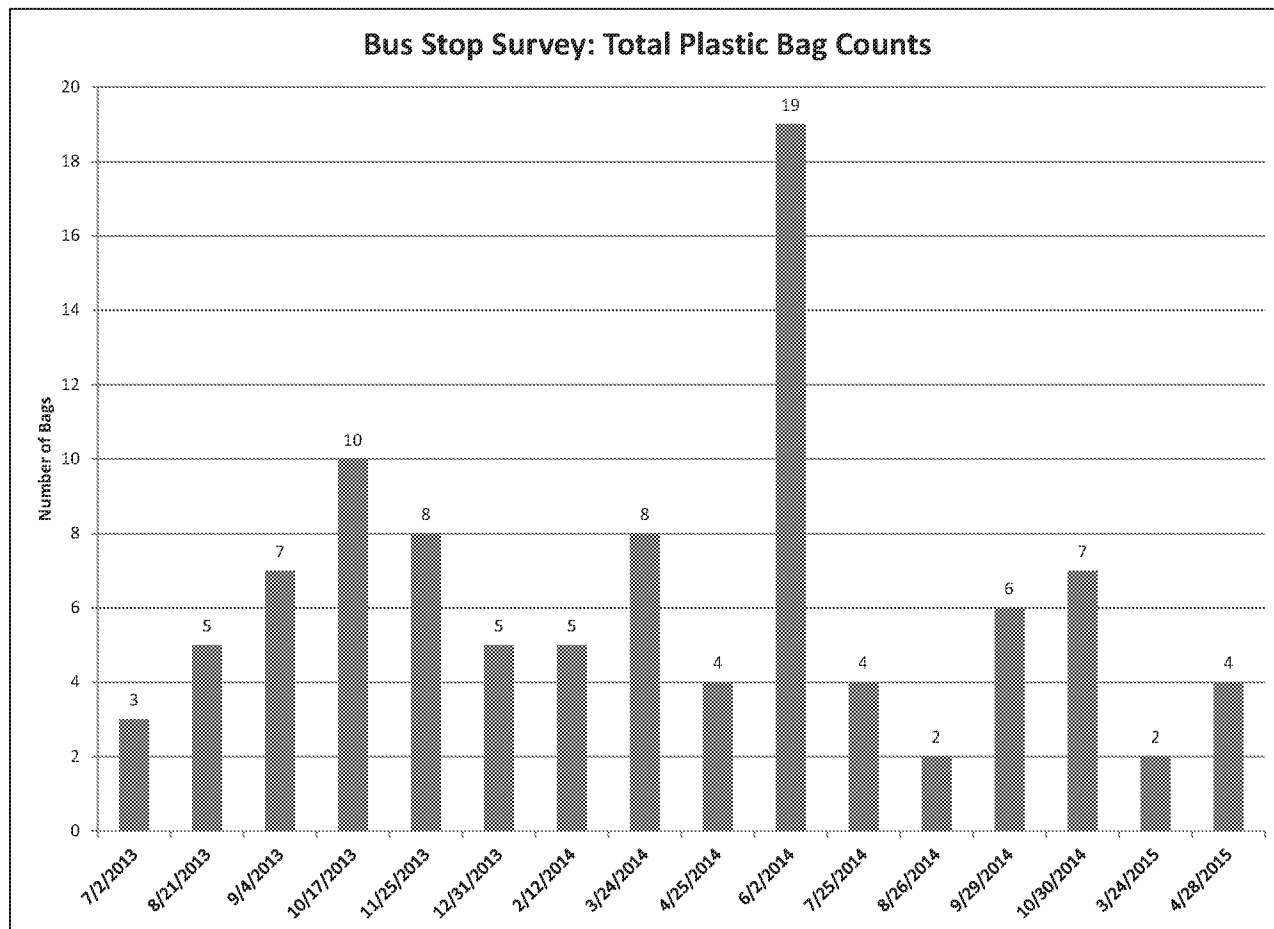


Figure 15. Bus Stop Survey: Number of Styrofoam by Survey Date

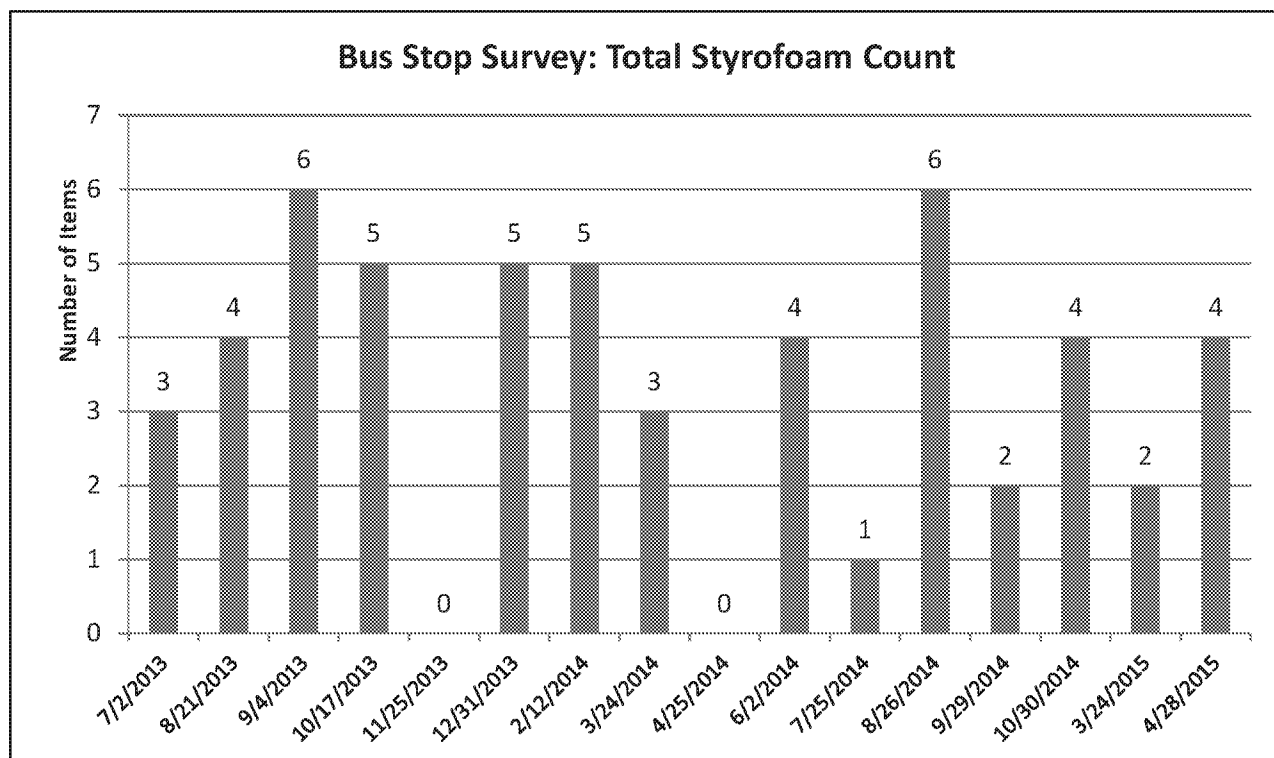
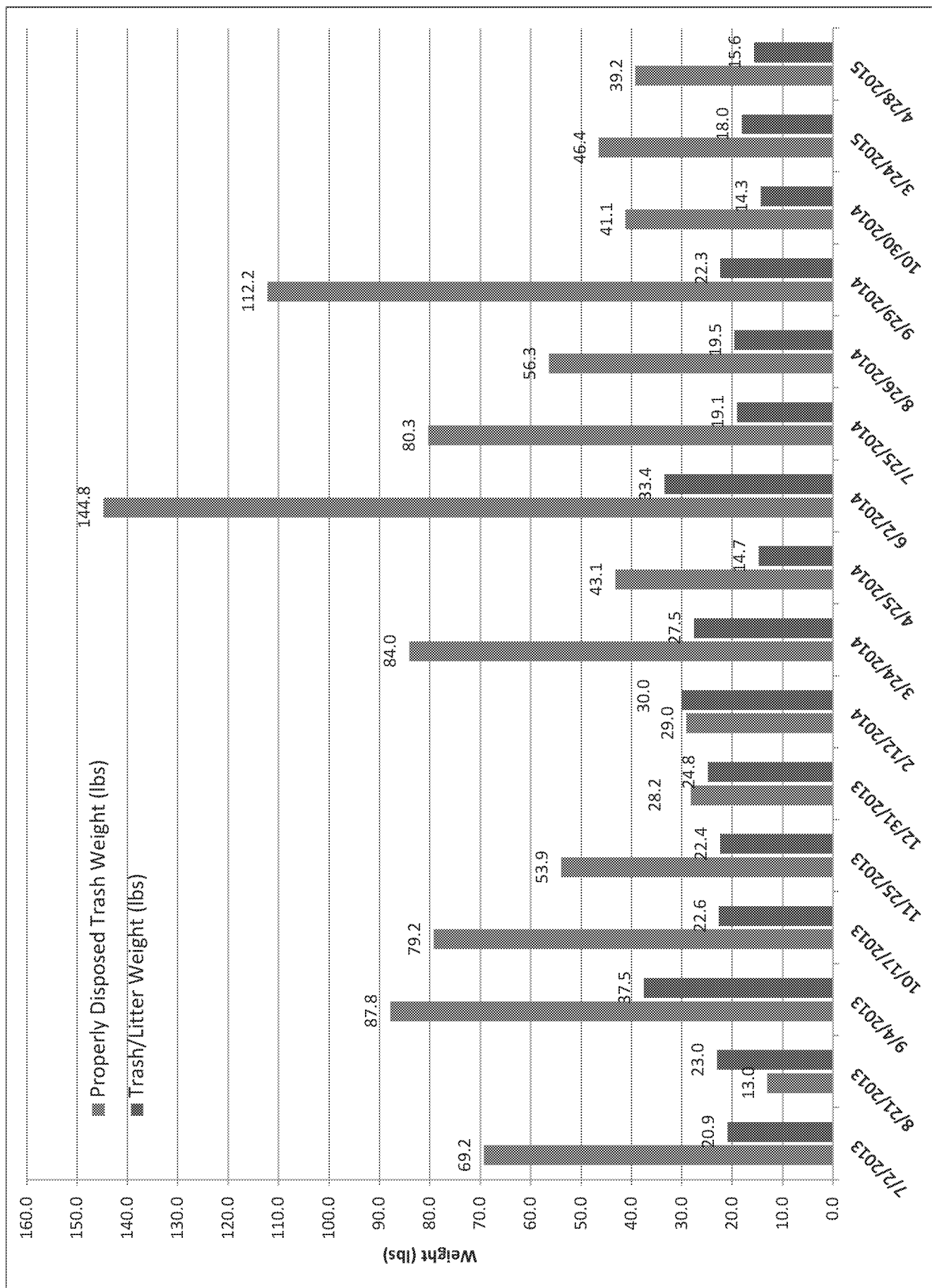


Figure 16. Bus Stop Survey: Properly Disposed Trash Versus Trash/Litter Weights by Survey Date



Recommendations:

Annual Stream-Level Trash Surveying:

- MCDEP should consider continuing the MDE-approved Anacostia tributary trash surveying protocol at the fifteen 500 foot long existing stream trash survey sites through 2016. This would provide long-term trends in stream trash condition data. It will also provide insight into the efficacy of the 2012 carryout plastic bag law and provide additional baseline information for polystyrene prior to the January 2016 selected polystyrene product ban.
- MCDEP should consider continuing to survey the existing five 250 foot long sites to provide the long-term trend accumulation rates. This generates long-term trash accumulation rates as it may relate to the following: local rainfall data, land use, upstream imperviousness, and trash reduction activities.

Stewart-April Lane Storm Drain, Walking, and Bus Stop Surveying:

- Overall, trash counts were higher in the commercial shopping area (Group 1) than in others. Considering this, MCDEP should consider trash reduction efforts to include: working with Ride On to increase the number of trash receptacles at bus stops or increase the frequency of trash receptacle clean out. If possible, determine the White Oak ridership general audience and target bus shelter trash reduction outreach campaigns to them. Additional trash management efforts could include continuing community clean-ups and targeting regular street sweeping along portions of Lockwood Drive and Stewart Lane.
- Trash/debris grates in storm drains appear to be working properly, but MCDEP should consider higher maintenance frequency post the leaf-fall season to minimize overflow into the storm drain.
- On numerous occasions, COG staff observed trash receptacles at bus stops that were overflowing onto the sidewalk. Conducting an assessment of how long it takes for particularly high-use receptacles to fill up would offer the MCDEP an opportunity to reduce trash by increasing trash pickups or installing additional receptacles in those areas.
- Given the mixed-use nature of the White Oak neighborhood, Montgomery County may consider the development of a partnership between the property management firms similar to Commercial Business District or Business Improvement District. Such partnership could employ local residents to remove trash and litter from the streets, maintain bioretention/swale systems and storm drain debris grates, and serve as part of the County's outreach program regarding trash and litter.
- Determining trash load per the storm drain catchment network may provide valuable information towards the Stewart-April Lane trash reduction activities. COG staff has begun this process by acquiring a spatial data layer of the storm drain network (Appendix 1, Figure 9).
- MCDEP should consider determining, for the Stewart April Lane subwatershed, a trash load reduction per hour of trash reduction activities.
- Conducting a pre- and post-outreach campaign assessment of trash levels would inform MCDEP on which efforts may or may not be successful in trash reduction.
- MCDEP may need to work more closely with the commercial property along the east side Lockwood Drive to reduce overflowing trash dumpsters conditions and manage the high litter conditions frequently observed in these areas. These areas may be significant trash sources to the storm drain network during rain events.
- MCDEP should investigate the feasibility of a temporary trash-trap device installation, similar to a Band-a-Long Trash Trap, immediately downstream of the 42" RCP outfall. Maintenance of the trash trap should be considered as part of the feasibility study.

References

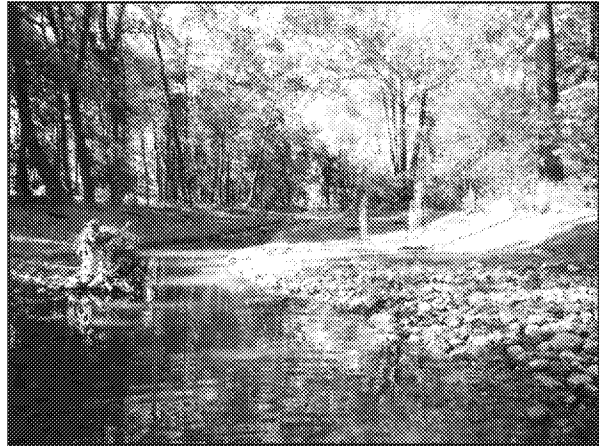
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Montgomery County: Anacostia Trash TMDL Monitoring-Related Efforts FY16 Technical Memorandum



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TABLE OF CONTENTS

Project Background	1
Task 1 - Annual Stream-Level Trash Monitoring	2
Recommendations	12
References	13

LIST OF FIGURES

Figure 1 - Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites)	4
Figure 2 - Station Trash Level Rating for Mean Items per 100 Feet	5
Figure 3 - Stream Summary - Percent Total of Top Five Trash Categories	7
Figure 4 - Stream Summary - Total Top Five Trash Categories	7
Figure 5 - Stream Summary - Total Number of Plastic Bags (2011 - 2016)	8
Figure 6 - Monthly Rainfall Accumulation	9
Figure 7 - Field Data Sheet	10

LIST OF TABLES

Table 1 - Anacostia Trash Reduction Workgroup’s Stream Trash Survey Index2

Table 2 - Stream Survey Sampling Results 2015-2016 (N=3)6

Table 3 - Stream Survey: Average Monthly Trash Accumulation (lbs per Month)6

Project Background

Per the approved September 2010 Anacostia Watershed Trash TMDL, Montgomery County (the County) is required by MDE/EPA to annually remove or prevent hundreds of tons of trash from entering its tributary streams to the Anacostia River. In order to accomplish this challenging task, it is critical that the County annually assess and estimate both stream and land-based trash levels to provide guidance for cost-effective litter reduction measures.

In 2010, Montgomery County Department of Environmental Protection (MCDEP) contracted with MWCOC to identify stream and land-based trash levels and existing major trash hot spots within the Anacostia Watershed portion of the County. Identification of trash sources and hot spots has enabled the County to better direct limited trash monitoring and reduction measures to where they are most needed. In particular, the Stewart-April Lane tributary drainage in White Oak, Silver Spring has been targeted as a County trash reduction focus catchment area.

As such, two major tasks were completed for this 12 month long project and are as follows:

- Task 1: Annual Stream-Level Trash Monitoring; and
- Task 2: Technical Memorandum

This technical memorandum will highlight results from Task 1.



Photo 1. The erosion behind a large tree fall at NWNW407D has created a new channel.



Photo 2. COG staff pick and record trash at a large strainer.



Photo 3. COG staff and intern sort through trash picked at PBSA100.

Task 1: Annual Stream-Level Trash Monitoring

Under this sub-task, COG employed the Anacostia tributary trash surveying protocol, using the MDE-approved field data sheet, to catalogue trash in 15 stream sites (Figure 1; Figure 7). This instream trash survey was performed three times (generally late spring and fall seasons): June-July 2015, October 2015 (before leaf fall), and June 2016. At each site, the total number of trash items within a 500 foot long stream reach was recorded and catalogued according to the 20 MDE trash category types. Note: due to recent legislation in the Anacostia watershed jurisdictions, COG now separates out “carry out bags” and “expanded polystyrene”, which will help identify trends in those items due to implementation of the legislation. Table 1 represents the 1998 Anacostia Trash Reduction Workgroup’s (ATRW) stream trash survey index, which provides a verbal ranking for the number of trash items per hundred feet range.

With the exception of the Paint Branch, Stewart-April Lane site (herein referred to as PBSA100), the FY16 trash monitoring stations remained the same as the stations monitored in the 2008-2009 Anacostia trash TMDL baseline monitoring effort (MWCOG, 2009 and MDE, 2010). The PBSA100 site is a County trash reduction focus catchment area and is deemed as a priority for trash monitoring. Therefore, PBSA100 was added in 2011 and LPLP205 has been omitted from the survey. In addition as part of the spring 2016 survey, the SCLB101 site was remeasured and moved downstream by about 50 feet due to a recently completed stream restoration at that location.

In addition to cataloguing the trash, COG removed and weighed trash items from the upstream 250 feet of the 500 foot long survey reach at five of the 15 sites. In doing so at these ‘pick sites’, COG generated a reasonable estimate of instream trash accumulation/loading rates between survey periods. Also, in keeping with the 2008-9 survey methodology, precipitation data were obtained from the two nearest weather stations. These were the Reagan National Airport (DCA) and the USDA Beltsville Agricultural Research Center (BARC) (Figure 6).

Table 1. Anacostia Trash Reduction Work-group’s Stream Trash Survey Index

Trash Index	
Verbal Ranking	No. Items/100 ft.
None - Very Light	0 - 10.0
Light	10.1 - 25.0
Moderate	25.1 - 50.0
High	> 50.1

Summary of Findings

- Figure 2 summarizes the mean verbal trash rating for each survey period. Sites where the trash level rankings increased from 2014-2015 (2016 wasn’t compared due to only one survey so far) include:
 - 1) NWNW402 from light to moderate level.
- Sites where trash level rankings decreased significantly include:
 - 1) NWNW407D from high to moderate level;
 - 2) SCSC314 from high to light level;
 - 3) NWBP205, and NWBF301 from moderate to light level (Figure 2).
- The trash level decrease observed at NWNW407D is due to severe erosion occurring behind the rootwad of the large tree fall, which has been acting as a strainer since 2014. This erosion has essentially created a new channel, which is allowing some of the trash to bypass the strainer (see Photo 1 on Page 1).
- PBSA100 continues to have extremely high trash levels.

- As seen in Figure 2, each site's mean verbal trash rating for the 2015 survey period is summarized as follows:
 - 1) Three sites = None - Very Light
 - 2) Six sites = Light
 - 3) Five sites = Moderate
 - 4) One site = High
- In 2015-2016, a total of 5,385 items and 66 strainers were counted in three surveys (Table 2). Strainers are natural or anthropogenic features such as log/debris dams, large protruding tree roots or rootwads, gabion baskets, large appliances, shopping carts, etc. Strainers effectively capture and temporarily retain trash, particularly floatables.
- Table 3 shows the monthly trash accumulation rate by weight for the five 'pick sites' for the 2015 and 2016 surveys. The highest rate (5.9 pounds per month) across the three survey periods was observed at NWNW407D in fall 2015, where the large strainer is still capturing floatable trash. At PBSA100, the mean rate across the three survey periods was 3.2 pounds per month which is lower than the 2011-2013 mean rate. The lowest rate (0.5 pounds per month) was observed, once again, at the Fairland Regional Park Site (LPLP301A) in summer 2016.
- As in the 2008-2009 and 2011-2013 surveys, the 2015-2016 top five trash categories were plastic bags, food packaging, plastic bottles, Styrofoam, and construction debris (Figures 3 and 4). Interestingly, the proportions of plastic bags has decreased from the 2011-2013 surveys, while the proportions of food packaging has increased.
- Figure 4 shows the total count for the top five trash categories for 2015-2016 (as well as previous survey years). The only trend observed from the original surveys until 2016 is a slight decrease in plastic bag counts.
- Figure 5 summarizes the plastic bag count for the 2015-2016 surveys (as well as previous survey years). The PBSA100 site had the highest plastic bag count.

Figure 1. Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites)

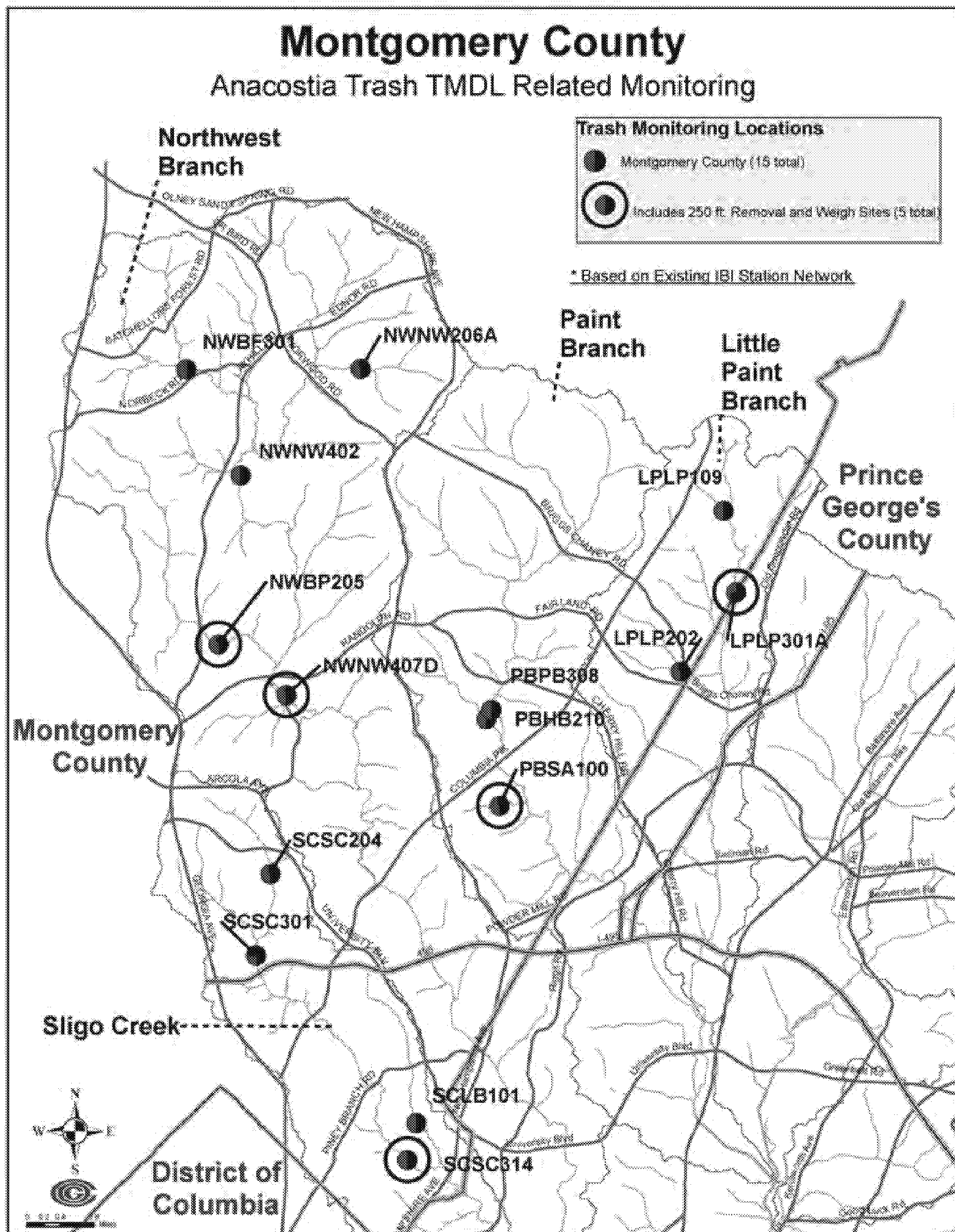


Figure 2. Station Trash Level Rating for Mean Items per 100 Feet

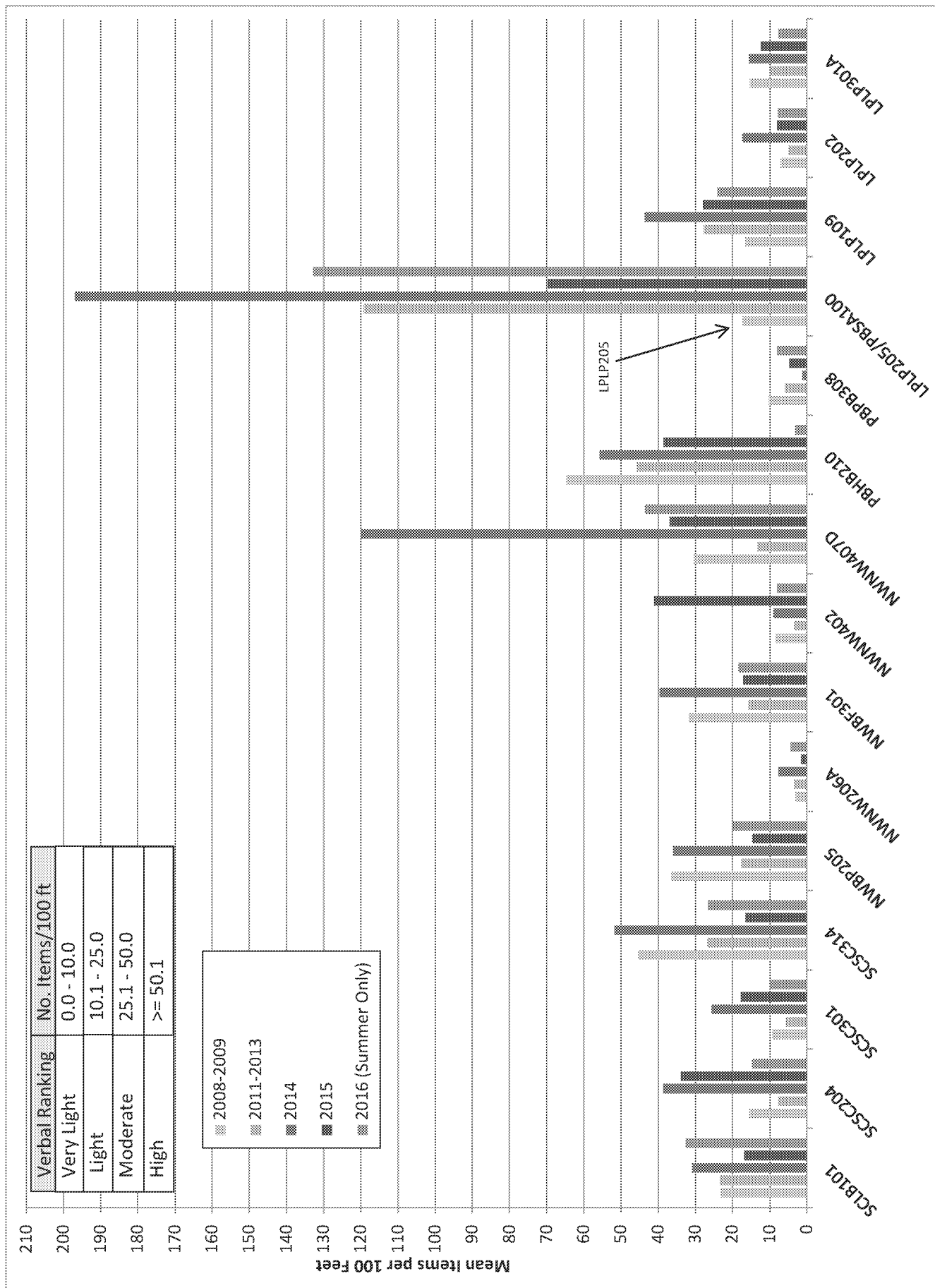


Table 2. Stream Survey Sampling Results 2015-2016 (N=3)

Site Name and Location	Site ID	Drainage Area (mi ²)	Total Number of Trash Items	Average Number of Trash Items (per site)	Mean No. of Trash Items Per 100ft	ARTW Verbal Trash Ranking	Top 6 Items	
							Top 3 Items	Next 3 Items
Sligo Creek (Long Branch)	SCLB101	0.99	432	144	9.60	High	9, 1, 1a	4, 2, 20
Sligo Creek (University Blvd)	SCSC204	0.99	185	62	4.11	Light	1, 9, 4	5, (2, 20 (tie))
Sligo Creek (Forest Glen Road)	SCSC301	2.87	150	50	3.33	Light	1, 9, (1a, 5 (tie))	20, 16, (2, 8 (tie))
Sligo Creek (Carroll Ave)	SCSC314	7.17	447	149	9.93	High	1, 9, 20	1a, 4, 2
Little Paint Branch (Fairland Pk North)	LPLP109	0.45	399	133	8.87	High	1, 9, 1a	2, 5, 4
Little Paint Branch (Tanglewood Tributary)	LPLP202	0.92	119	40	2.64	Light	9, 2, 1	20, 5, 1a
Northwest Branch (Batchellors Run)	NWBF301	2.78	282	94	6.27	Moderate	6, 13a, 20	1, 13b, 8
Northwest Branch (Brynats Nursery Tributary)	NWNNW206A	1.35	52	17	1.16	Very Light	13c, 16, (5, 9 (tie))	(1, 3, 20 (tie))
Northwest Branch (Layhill Park)	NWNNW402	12.09	112	37	2.49	Light	2, 19, 1	13c, 6a, (9, 3 (tie))
Little Paint Branch (Fairland Pk Central)	LPLP301A	2.22	162	54	3.60	Light	1, 1a, 9	2, 20, 5
Northwest Branch (Bel Pre Creek)	NWBP205	3.74	291	97	6.47	Moderate	1, 9, 4	1a, 2, 8
Paint Branch (Hollywood Branch)	PBHB210	1.59	238	79	5.29	Moderate	1, 9, 5	1a, 2, 20
Paint Branch (Valley Mill Park)	PBPB308	9.23	74	25	1.64	Very Light	9, 1a, 1	2, 4, 20
Northwest Branch (Kemp Mill Rd)	NWNNW407D	21.19	815	272	18.11	High	2, 5, 9	1, 4, 19
Paint Branch (Stewart April Ln)	PBSA100	0.34	1627	542	36.16	High	9, 1, 1a	2, 20, 5

Table 3. Stream Survey: Average Monthly Trash Accumulation (lbs per Month)

Site Name	Site ID	Monthly Trash Accumulation (lbs per Month)										Average Monthly Accumulation Rate	Average Annual Accumulation Rate (lbs per Year)
		Summer 2011 (June, July, Aug)	Fall 2011 (Oct)	Summer 2012 (July)	Fall 2012 (Oct, Dec)	Summer 2013 (June)	Fall 2013 (Sept-Oct)	Summer 2014 (June-July)	Fall 2014 (Oct)	Summer 2015 (July)	Fall 2015 (Oct)	Summer 2016 (June)	
Fairland Regional Park	LPLP301A	1.6	1.1	0.2	0.1	0.3	1.3	0.5	0.2	0.6	1.3	0.51	8.4
Carroll Avenue	SCSC314	1.0	3.3	1.1	1.0	1.2	1.2	1.1	1.6	0.9	1.5	0.85	16.1
Bel Pre Creek	NWBP205	6.0	1.1	1.3	1.6	0.9	1.3	2.4	0.8	1.3	1.2	1.35	21.0
Stewart April Lane	PBSA100	9.1	4.4	3.8	5.6	5.3	6.2	6.3	5.1	2.8	3.6	3.17	60.4
Kemp Mill Road	NWNNW407D	2.2	1.2	1.6	0.3	1.0	1.3	5.5	7.8	5.6	5.9	5.39	41.2

Figure 3. Stream Summary - Percent Total of Top Five Trash Categories

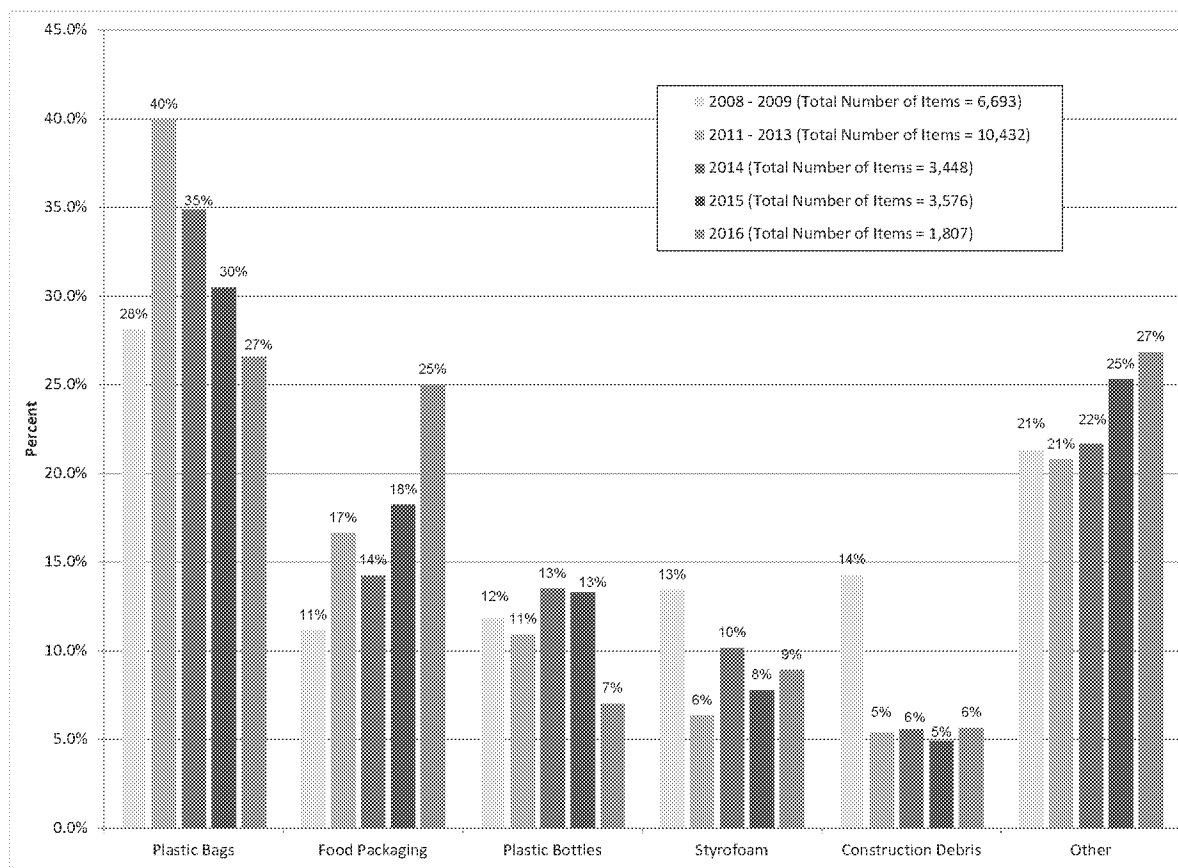


Figure 4. Stream Summary - Total Top Five Trash Categories (PBSA100 not included)

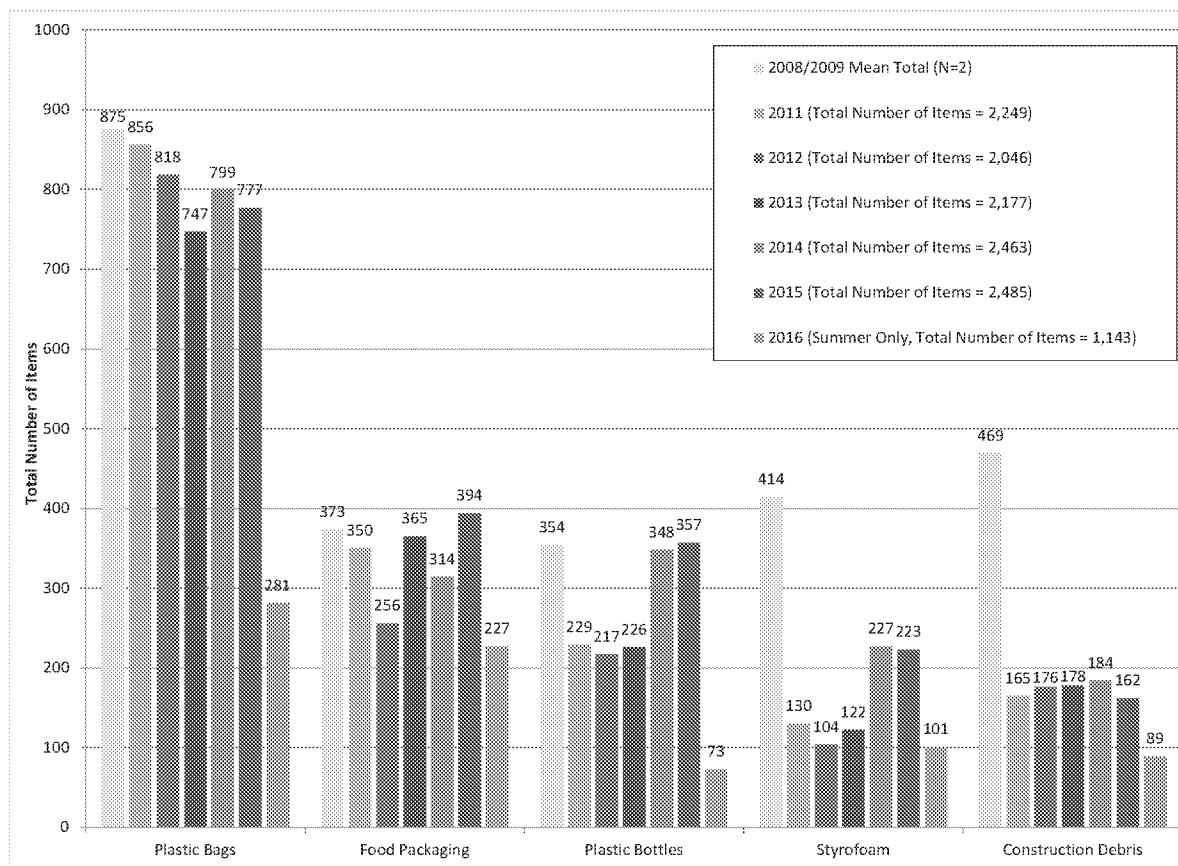


Figure 5. Stream Summary - Total Number of Plastic Bags (2011 - 2016)

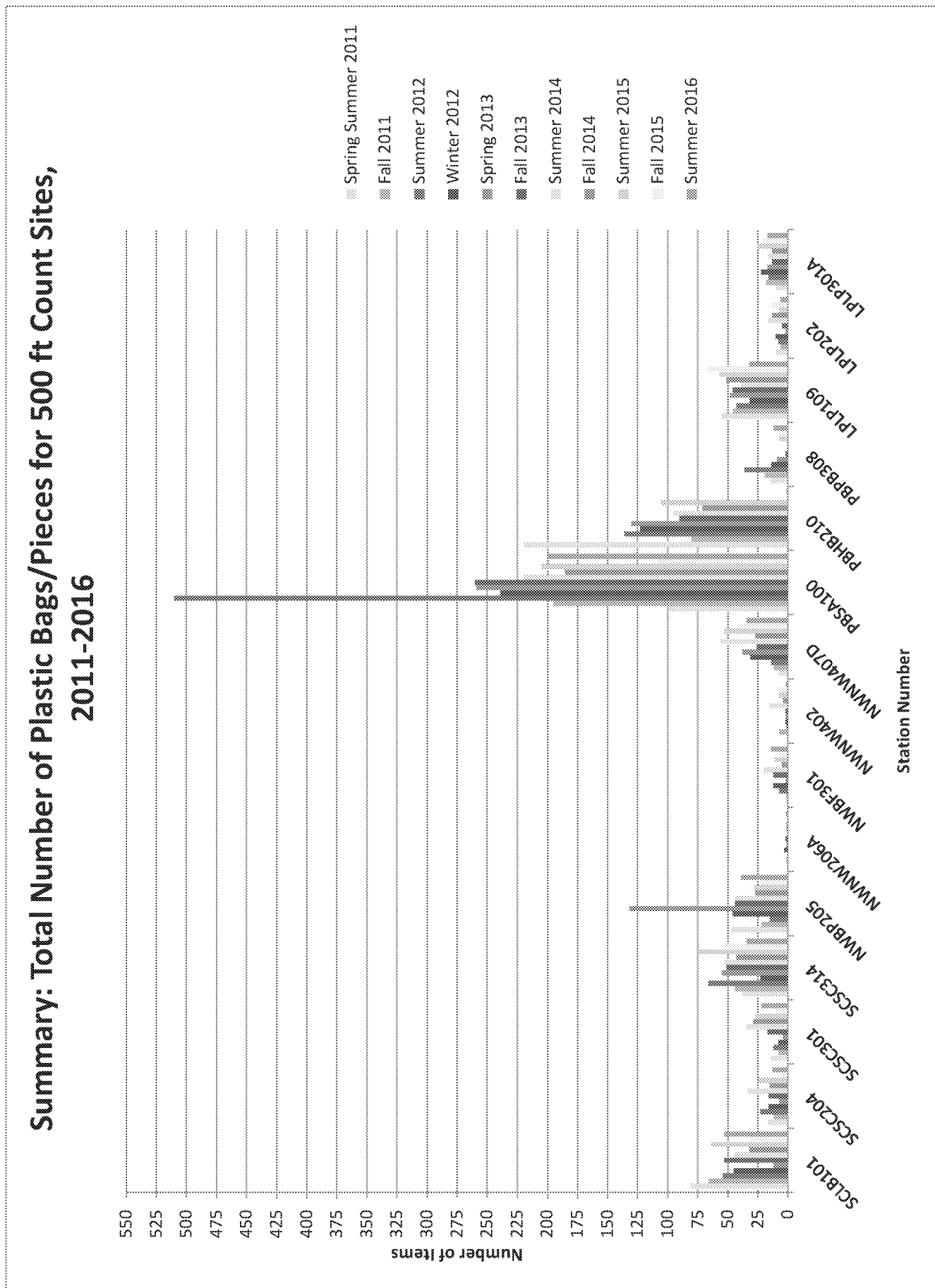


Figure 6. Monthly Rainfall Accumulation

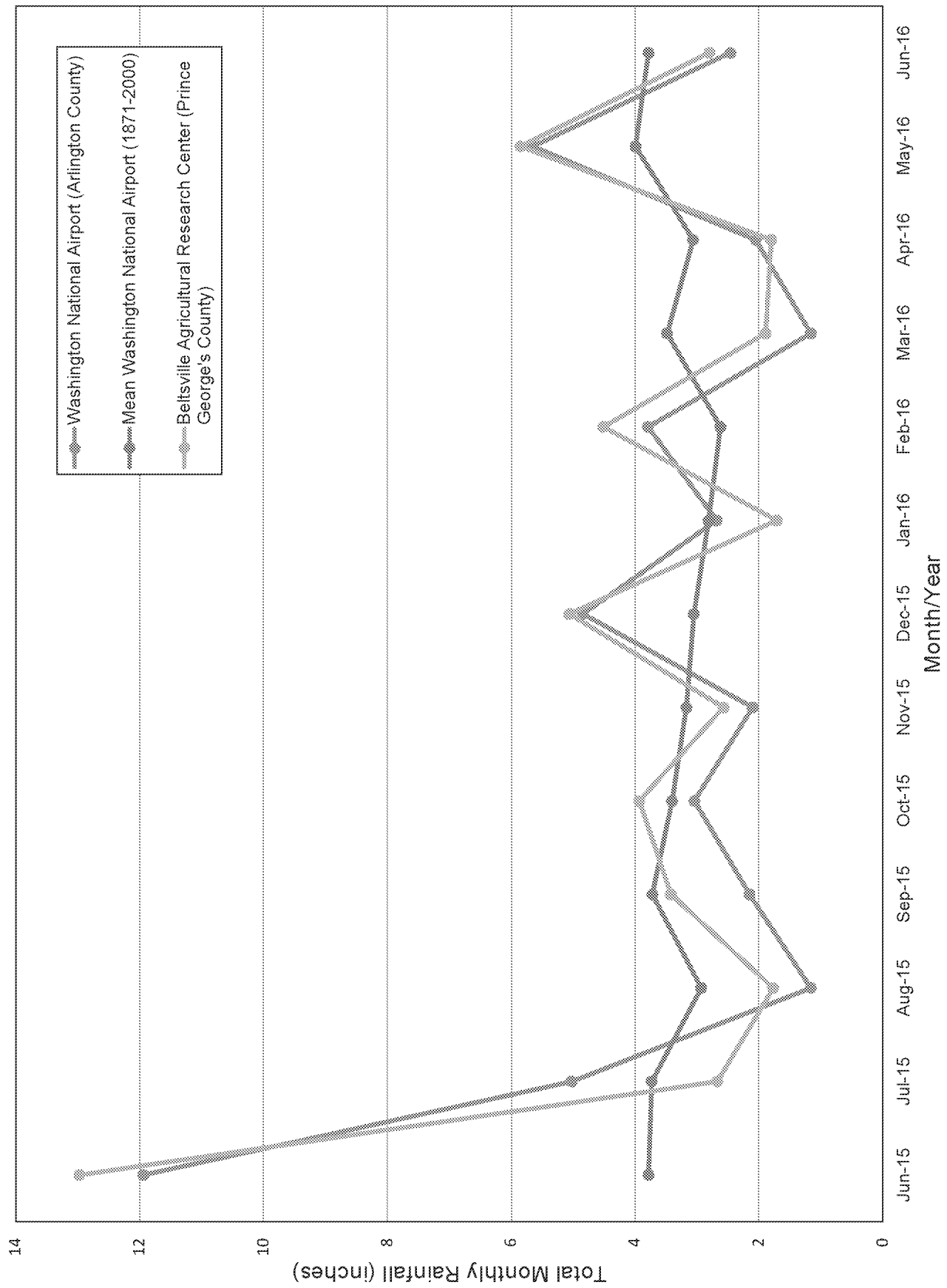


Figure 7. Field Data Sheet

ANACOSTIA WATERSHED TRASH SURVEY – MDE 8 Digit Watershed Code - 02140205

DATE: _____ START TIME: _____
 CREW: _____ END TIME: _____

SUBWATERSHED:									
STATION NUMBER:									
STATION NAME:									
STARTING COORD. (DDMMSS):		Lat:		Long:					
END COORD. (DDMMSS):		Lat:		Long:					
SURVEY TYPE (check applicable)									
1. Stream		Length (ft):							
		No. of Trash "Strainers":							
		Riparian Buffer Conditions:							
2. Trash Netting System		Net Number and Total Weight (lbs)							
Total Number of Nets/ Nets Surveyed		1	2	3	4	5	6	7	8
3. Road Right of Way		300' long and 5' wide on either side of curb gutter per side							
4. Stormwater Management Pond									
5. Storm Drain Outfall (Trash Fence)		DA (Acres/mi ²) =							
GENERAL LAND USES (check all applicable)									
• Low Density Residential (large lot, single family)									
• Medium Density Residential (small lot, single family, and/or townhouses)									
• High Density Residential (apartments)									
• Commercial									
• Industrial									
• Institutional (libraries, schools, religious)									
• Recreational Area (developed)									
• Forest									
• Agriculture									
GENERAL STATION DESCRIPTION:									
PHOTO NUMBERS:									
TOTAL NO. OF OBSERVED ITEMS:									
TOP THREE ITEMS AND ASSOCIATED SUB-TOTALS:									
TOTAL WEIGHT (OPTIONAL):		(lbs)							

Figure 7 continued: Field Data Sheet

ANACOSTIA WATERSHED TRASH SURVEY (Cont'd)

STATION NO. : _____

Total Weight: _____ (Check if applicable)

DATE : _____

Less Container Weight: _____ (Check if applicable)

	Trash Item	Field Count		Number of Items (Sub-total)	Optional Weight ()
		Carry Out	Other		
1	Plastic Bags				
2	Plastic Bottles				
3	Glass Bottles				
4	Aluminum Cans				
5	Styrofoam (cups, packaging, etc.) 10 peanuts = 1	Expanded Polystyrene	Other		
6	Paper (newspapers, magazines, etc.)				
7	Cardboard				
8	Cloth/Clothing/Carpeting				
9	Food Packaging				
10	Auto :				
	Oil Quart Containers				
	Oil Filters				
	Antifreeze Containers				
	Body Parts: Large >1 ft ²				
	Small <1 ft ²				
11	Car Batteries				
12	Tires (cars, trucks)				
13	Construction Debris :				
	Bricks (>1/2 brick)				
	Concrete				
	Lumber				
	Misc. (e.g. drywall, etc.)				
14	Appliance(s)				
15	Wooden Pallets				
16	Metal (Drums, Cans, Pipes)				
17	Shopping Carts				
18	Toiletries/Drug Containers				
19	Sports Equipment/Toys				
20	Miscellaneous				
TRASH TOTAL					
DEBRIS SUBTOTAL					
				Total	
TOTAL WEIGHT					

Container Weight =

of Strainers =

Recommendations:

Annual Stream-Level Trash Surveying:

- MCDEP should consider continuing the MDE-approved Anacostia Tributary trash surveying protocol at the fifteen 500 foot long existing stream trash survey sites through 2017. This would provide long-term trends in stream trash condition data. It will also provide insight into the efficacy of the 2012 carryout plastic bag law and provide additional baseline information for polystyrene prior to targeted implementation of the January 2016 selected polystyrene product ban.
- MCDEP should consider continuing to survey the existing five 250 foot long sites to provide the long-term trend accumulation rates. This generates long-term trash accumulation rates as it may relate to the following: local rainfall data, land use, upstream imperviousness, and trash reduction activities.
- COG recommends that MCDEP work with M-NCPPC to identify and remove major tree falls that are acting as trash strainers and points of major erosion. The tree fall at NWNW407D would be a good candidate for such an action; our surveys have seen dramatic increases in floatables caught in the branches and associated debris at this site since 2014. PBSA100 also has a large tree fall that acts as a strainer across several parts of the stream.
- As MCDEP moves forward with the White Oak social marketing campaign for trash, COG recommends beginning discussions (and including the campaign's contracting organizations) regarding "post-implementation" bus stop, storm drain, and walking surveys for trash in this neighborhood.
- COG recommends reevaluating and updating high priority trash sites, including identifying new hot spots.

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TABLE OF CONTENTS

Project Background	1
Task 1 - Annual Stream-Level Trash Monitoring	2
Recommendations.....	11
References.....	12
Attachment A: Field Data Sheet.....	13

LIST OF PHOTOS AND FIGURES

Photo 1. Debris Dam/Strainer at NWNW407D Catching Floatable Trash	1
Photo 2. A Recent Tree Fall at PBSA100 Acts as a Strainer and Catching Floatable Trash	1
Photo 3. COG Staff Sort and Weigh Trash from SCSC314.....	1
Figure 1. Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites)	4
Figure 2. FY17 Count Survey - Percent Count Distribution	6
Figure 3. "Pick Sites" Summary - Pounds Removed Per Site (2011 - 2017)	8
Figure 4. FY17 "Pick Sites" Survey - Percent Weight Distribution.....	9
Figure 5. 2016-2017 Rainfall Data-Monthly Total for DCA and BARC	10

LIST OF TABLES

Table 1. ATRW's Stream Trash Survey Index	2
Table 2. Stream Survey Sampling Results Fall 2016	5
Table 3. Stream Survey Sampling Results Spring 2017	5
Table 4. Stream Survey: Average Monthly Trash Accumulation (lbs per Month) 2011 - 2017.....	7
Table 5. October 2016 "Pick Sites" - Weight of Selected Items.....	7
Table 6. Spring 2017 "Pick Sites" - Weight of Selected Items.....	7

Project Background

Per the approved September 2010 Anacostia Watershed Trash TMDL, Montgomery County (the County) is required by MDE/EPA to annually remove or prevent hundreds of tons of trash from entering its tributary streams to the Anacostia River. In order to accomplish this challenging task, it is critical that the County annually assess and estimate both stream and land-based trash levels to provide guidance for cost-effective litter reduction measures.

In 2010, Montgomery County Department of Environmental Protection (MCDEP) contracted with Metropolitan Washington Council of Governments (COG) to identify stream and land-based trash levels and existing major trash hot spots within the Anacostia Watershed portion of the County. Identification of trash sources and hot spots has enabled the County to better direct limited trash monitoring and reduction measures to where they are most needed. In particular, the Stewart-April Lane tributary drainage in White Oak, Silver Spring has been targeted as a County trash reduction focus catchment area.

As such, two major tasks were completed for this 12 month long project and are as follows:

- Task 1: Annual Stream-Level Trash Monitoring; and
- Task 2: Technical Memorandum Development

This technical memorandum will highlight results from Task 1.



Photo 1. Debris Dam/Strainer at NWNW407D Catching Floatable Trash



Photo 2. A Recent Tree Fall at PBSA100 Acts as a Strainer and Catching Floatable Trash



Photo 3. COG Staff Sort and Weigh Trash from SCSC314

Task 1: Annual Stream-Level Trash Monitoring

Under this task, COG employed the Anacostia tributary trash surveying protocol to catalogue trash in 15 stream sites (Figure 1), using the MDE-approved field data sheet, (Attachment A). This instream trash survey was performed two times within the fiscal year 2017 (i.e., July 2016 through June 2017 (FY17)). The surveys were conducted in October 2016 (before leaf off) and April/May 2017. At each site, the total number of trash items within a 500 foot long stream reach was recorded and catalogued according to the 20-plus MDE trash items. It should be noted that due to the Montgomery County Carryout Bag Law and ban on expanded polystyrene food service ware and loose fill packaging, COG now separates out “carryout bags” and “expanded polystyrene”, which will help identify possible trends in those items due to legislation implementation. Table 1 represents the 1998 Anacostia Trash Reduction Workgroup’s (ATRW) stream trash survey index, which provides a standardized verbal ranking for the number of trash items per hundred feet.

With the exception of the Paint Branch, Stewart-April Lane site (herein referred to as PBSA100), the FY17 trash monitoring stations remained the same as the stations monitored in the 2008-2009 Anacostia trash TMDL baseline monitoring effort (COG 2009 and MDE 2010). The PBSA100 site is a County trash reduction focus catchment area and is deemed as a priority for trash monitoring. Therefore, PBSA100 was added and LPLP205 has been omitted from the survey since 2011.

In addition to cataloguing the trash, COG removed and weighed trash items from the upstream 250 feet of the 500 foot long survey reach at five of the 15 sites. In doing so at these “pick sites”, COG generated a reasonable estimate of instream trash accumulation rates between survey periods. Also, in keeping with the 2008-9 survey methodology, precipitation data were obtained from the two nearest weather stations. This information was summarized from the Washington National Airport (DCA) and the USDA Beltsville Agricultural Research Center (BARC).

Table 1. Anacostia Trash Reduction Workgroup's Stream Trash Survey Index

Trash Index	
Verbal Ranking	No. Items/100 ft.
None - Very Light	0 - 10.0
Light	10.1 - 25.0
Moderate	25.1 - 50.0
High	50.1 - 100.0

As previously mentioned, the FY17 trash survey was performed twice; in October 2016 (before leaf off), and April/May 2017, respectively. With the exception of Table 4 and Figure 3, the following tables and figures summarize the findings from the FY17 survey.

Summary of Findings

- Tables 2 and 3 summarize the fall 2016 and spring 2017 surveys, respectively. Fall 2016 trash verbal ranking were generally in the very light to light range with exception of the moderate ranking at NWNW407D and the high ranking at PBSA100. Spring 2017 survey trash levels were higher than the fall surveys, with four moderate and one high verbal ranking. SCLB101 and SCSC314 both experienced notable trash level increases.
- Figure 2 summarizes the FY17 count survey as percent of the total trash item. Five items (i.e., plastic bottles, food packaging, plastic bags, carryout plastic bags, and miscellaneous items) are in the order of highest to lowest percent of total and comprise 72 percent of the total items counted. The reader is referred to Attachment A (e.g., the COG trash data sheet) for the list of trash items.
- Table 4 shows the monthly trash accumulation rate by weight for the five “pick sites” since the 2011 summer survey. PBSA100 and NWNW407D continue to be the number 1 and 2 highest rates, respectively. The LPLP301A parkland site continues to be the lowest accumulation rate. It should be noted that prior to the summer 2014 survey, the rate at NWNW407D ranged from 0.3 to 2.2 pounds per month. After 2014 and the presence of a large strainer (tree fall across the stream), the accumula-

tion rate range has increased to 3.1 - 7.8 pounds per month. Figure 3 shows similar results as Table 4 for the pounds of trash removed from each site over 13 surveys.

- Tables 5 and 6 highlight the weight of selected trash items at the “pick sites” for the FY17 surveys. As anticipated, the weight of expanded polystyrene is the lowest among these selected items. The weight of all plastic bags (e.g., carryout and other bags) is the highest among all trash items.
- Figure 4 shows the FY17 “pick sites” survey as percent of the total trash item weight. Five items (i.e., plastic bags, plastic bottles, cloth/carpeting, carryout plastic bags and aluminum cans) are listed in the order of highest to lowest percent of total and comprise 82 percent of the total FY17 weight.
- Figure 5 shows monthly total rainfall at DCA and BARC weather stations. With the exception of May 2016 at DCA and July 2016 at BARC, monthly rainfall totals were either near or just below the 30 year mean monthly rainfall totals.

Figure 1. Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites)

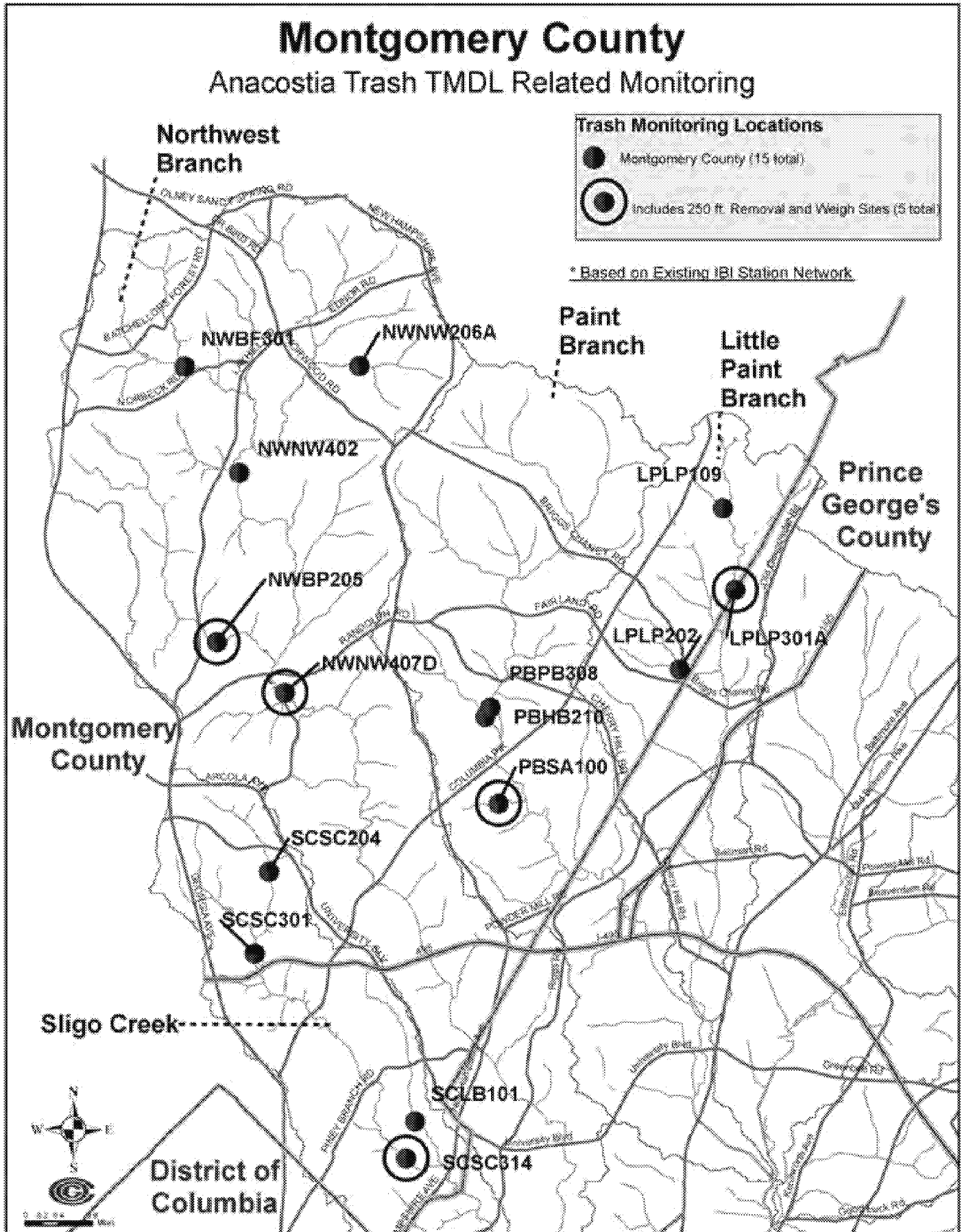


Table 2. Stream Survey Sampling Results Fall 2016

Site ID	Station Name	Subwatershed	Total Number of Items	Mean No. of Trash Items Per 100ft	Verbal Ranking	Strainers
SCLB101	Long Branch	Sligo Creek	83	16.6	Light	0
SCSC204	University Blvd	Sligo Creek	30	6.0	Very Light	0
SCSC301	Forest Glen Rd	Sligo Creek	38	7.6	Very Light	1
SCSC314	Carroll Avenue	Sligo Creek	93	18.6	Light	0
NWBP205	Bel Pre Creek	Northwest Branch	73	14.6	Light	1
NWNW206A	Bryant's Nursery Run	Northwest Branch	11	2.2	Very Light	2
NWBF301	Batchellors Run	Northwest Branch	70	14.0	Light	2
NWNW402	Layhill Park	Northwest Branch	18	3.6	Very Light	4
NWNW407D	Kemp Mill Rd	Northwest Branch	159	31.8	Moderate	2
PBHB210	Hollywood Branch	Paint Branch	53	10.6	Light	0
PBPB308	Valley Mill Park	Paint Branch	5	1.0	Very Light	0
PBSA100	Stewart-April Lane	Paint Branch	667	133.4	High	1
LPLP109	Fairland Regional Park (north)	Little Paint Branch	123	24.6	Light	2
LPLP202	BriggsChaney Rd	Little Paint Branch	28	5.6	Very Light	1
LPLP301A	Fairland Regional Park (central)	Little Paint Branch	31	6.2	Very Light	3

Table 3. Stream Survey Sampling Results Spring 2017

Site ID	Station Name	Subwatershed	Total Number of Items	Mean No. of Trash Items Per 100ft	Verbal Ranking	Strainers
SCLB101	Long Branch	Sligo Creek	157	31.4	Moderate	0
SCSC204	University Blvd	Sligo Creek	42	8.4	Very Light	0
SCSC301	Forest Glen Rd	Sligo Creek	17	3.4	Very Light	1
SCSC314	Carroll Avenue	Sligo Creek	173	34.6	Moderate	0
NWBP205	Bel Pre Creek	Northwest Branch	93	18.6	Light	1
NWNW206A	Bryant's Nursery Run	Northwest Branch	10	2.0	Very Light	2
NWBF301	Batchellors Run	Northwest Branch	67	13.4	Light	2
NWNW402	Layhill Park	Northwest Branch	52	10.4	Light	4
NWNW407D	Kemp Mill Rd	Northwest Branch	220	44.0	Moderate	2
PBHB210	Hollywood Branch	Paint Branch	116	23.2	Light	0
PBPB308	Valley Mill Park	Paint Branch	12	2.4	Very Light	0
PBSA100	Stewart-April Lane	Paint Branch	738	147.6	High	1
LPLP109	Fairland Regional Park (north)	Little Paint Branch	134	26.8	Moderate	2
LPLP202	BriggsChaney Rd	Little Paint Branch	28	5.6	Very Light	1
LPLP301A	Fairland Regional Park (central)	Little Paint Branch	43	8.6	Very Light	3

Figure 2. FY17 Count Survey - Percent Count Distribution

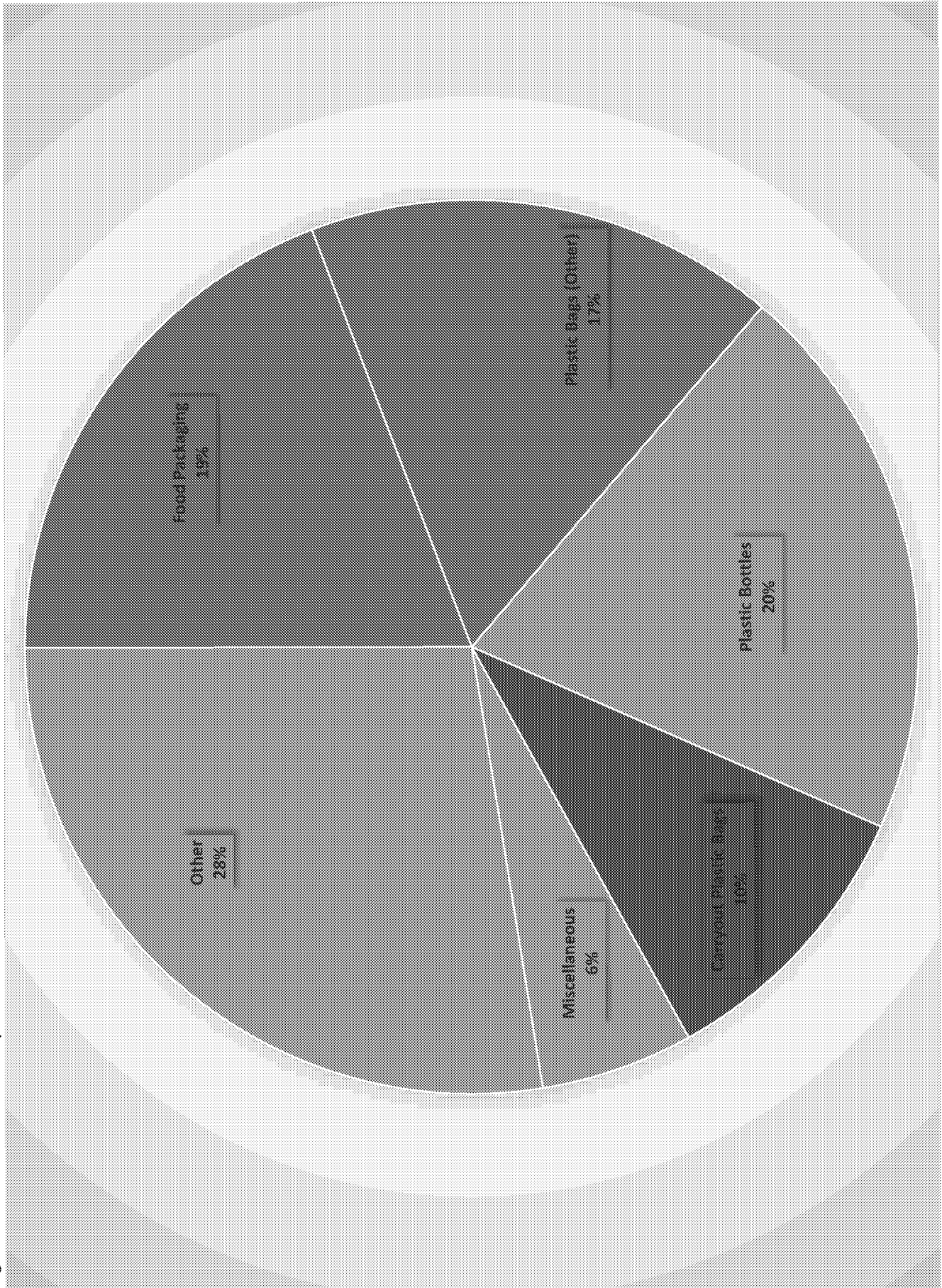


Figure 3. "Pick Sites" Summary - Pounds Removed Per Site (2011 - 2017)

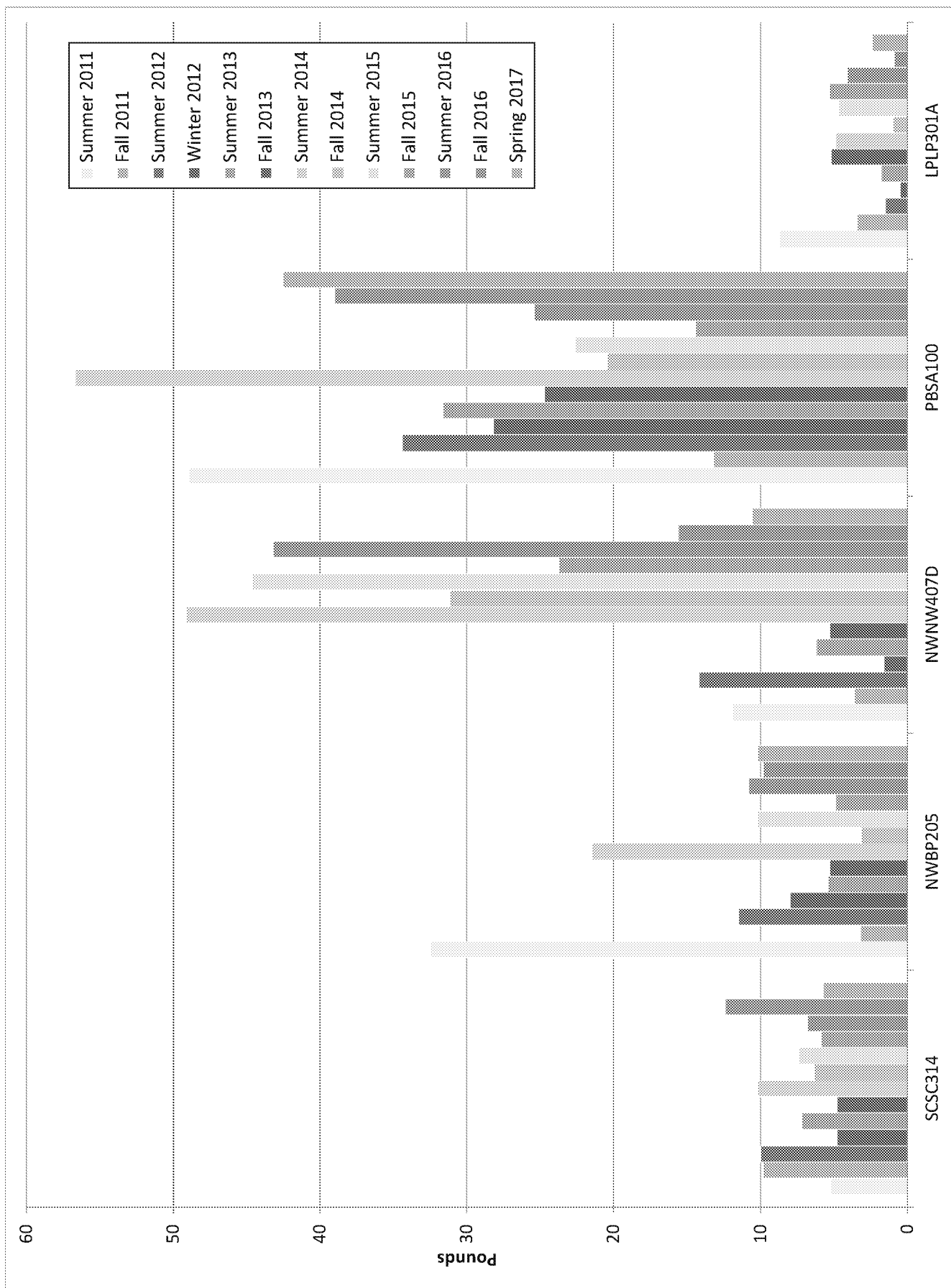


Figure 4. FY17 "Pick Sites" Survey - Percent Weight Distribution

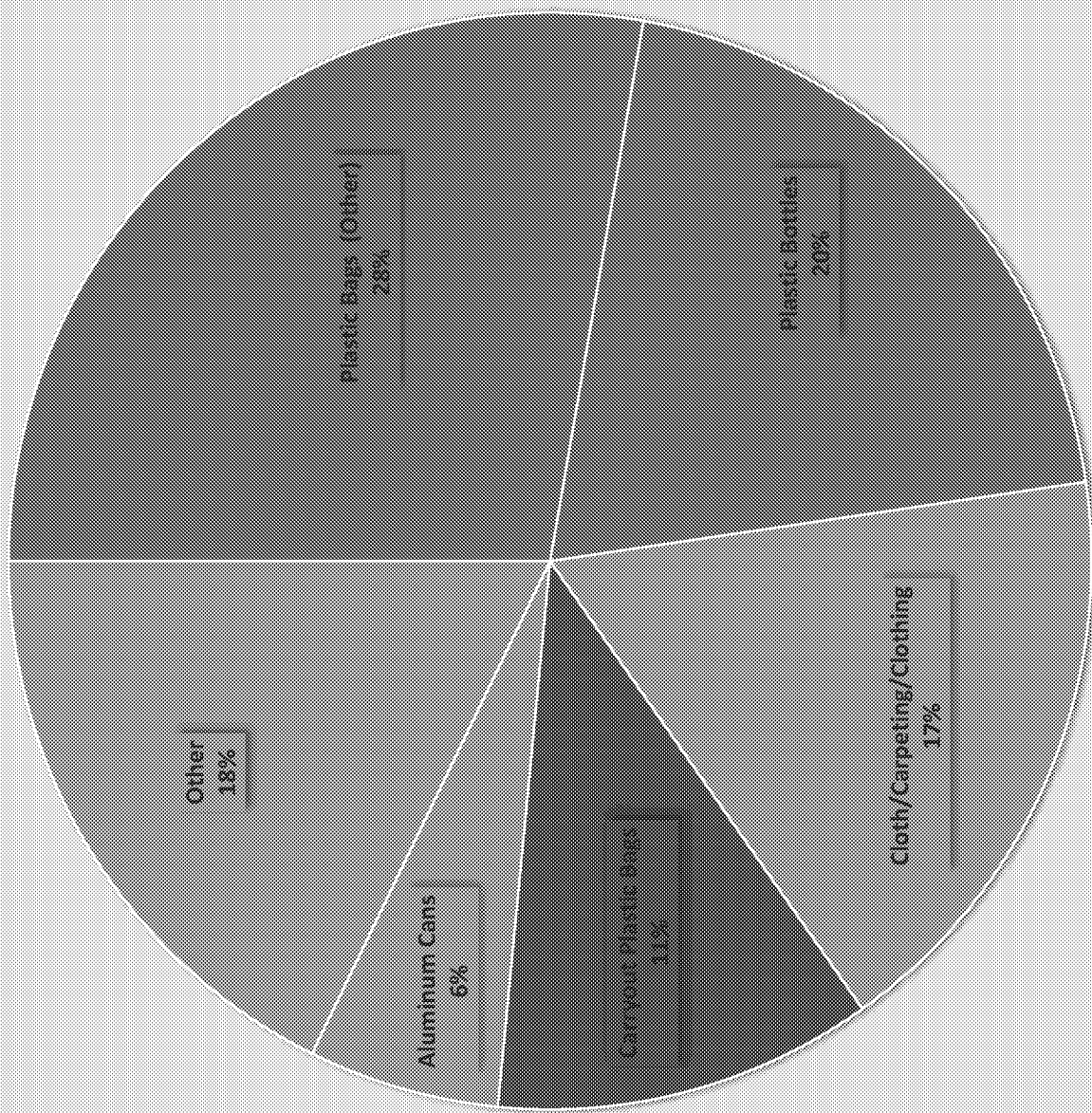
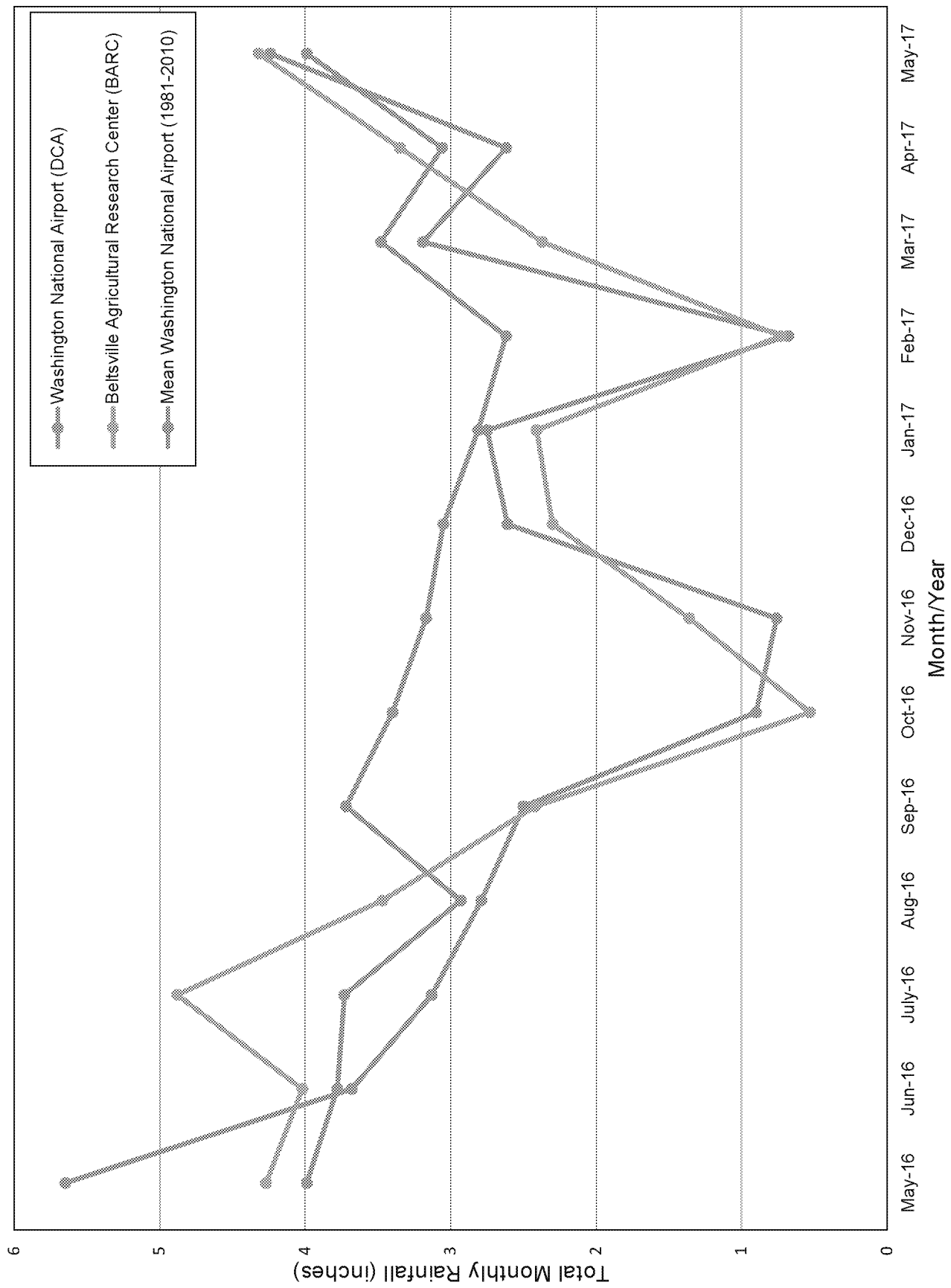


Figure 5. 2016-2017 Rainfall Data - Monthly Total for DCA and BARC Stations



Recommendations:

Annual Stream-Level Trash Surveying:

- MCDEP should consider continuing the MDE-approved Anacostia Tributary trash surveying protocol at the fifteen 500 foot long existing stream trash survey sites through 2018. This would provide long-term trends in stream trash condition data. It will also provide insight into the efficacy of the 2012 carryout plastic bag law and provide additional baseline information for polystyrene prior to targeted implementation of the January 2016 selected polystyrene product ban.
- MCDEP should consider continuing to survey the existing five 250 foot long sites to provide the long-term trend accumulation rates. This generates long-term trash accumulation rates as it may relate to the following: local rainfall data, land use, upstream imperviousness, and trash reduction activities.
- COG recommends that MCDEP work with M-NCPPC to identify and remove major tree falls that are acting as trash strainers and creating areas of severe bank erosion. The tree fall at NWNW407D would be a good candidate for such an action as our surveys have seen dramatic increases in floatables caught in the branches and associated debris at this site since 2014. PBSA100 also has a large tree fall that acts as a strainer within the stream.
- As MCDEP moves forward with the White Oak social marketing campaign for trash, COG recommends beginning discussions (and including the campaign's contracting organizations) regarding "post-implementation" bus stop, storm drain, and walking surveys for trash in this neighborhood.
- COG recommends reevaluating and updating high priority trash sites, including identifying new hot spots.
- COG recommends performing an evaluation for candidate sites for the Bandalong litter trap or similar installation in the Anacostia.

References

Maryland Department of the Environment (MDE) and District of Columbia, Department of Environment (DDOE). 2010. Total Maximum Daily Loads of Trash for the Anacostia River Watershed, Montgomery and Prince George's Counties, Maryland and The District of Columbia - Draft. Submitted to EPA (U.S. Environmental Protection Agency). Baltimore, MD.

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Metropolitan Washington Council of Governments (COG). 2009. Anacostia Trash TMDL, Work/Quality Assurance Project Plan. Prepared for Montgomery County Department of Environmental Protection and Prince George's County Department of Environmental Resources. Washington, DC.

ANACOSTIA WATERSHED TRASH SURVEY – MDE 8 Digit Watershed Code - 02140205

DATE: _____ START TIME: _____
 CREW: _____ END TIME: _____

SUBWATERSHED:									
STATION NUMBER:									
STATION NAME:									
STARTING COORD. (DDMMSS):		Lat:		Long:					
END COORD. (DDMMSS):		Lat:		Long:					
SURVEY TYPE (check applicable)									
1. Stream		Length (ft):							
		No. of Trash "Strainers":							
		Riparian Buffer Conditions:							
2. Trash Netting System		Net Number and Total Weight (lbs)							
Total Number of Nets/ Nets Surveyed		1	2	3	4	5	6	7	8
3. Road Right of Way		300' long and 5' wide on either side of curb gutter per side							
4. Stormwater Management Pond									
5. Storm Drain Outfall (Trash Fence)		DA (Acres/mi ²) =							
GENERAL LAND USES (check all applicable)									
• Low Density Residential (large lot, single family)									
• Medium Density Residential (small lot, single family, and/or townhouses)									
• High Density Residential (apartments)									
• Commercial									
• Industrial									
• Institutional (libraries, schools, religious)									
• Recreational Area (developed)									
• Forest									
• Agriculture									
GENERAL STATION DESCRIPTION:									
PHOTO NUMBERS:									
TOTAL NO. OF OBSERVED ITEMS:									
TOP THREE ITEMS AND ASSOCIATED SUB-TOTALS:									
TOTAL WEIGHT (OPTIONAL):		(lbs)							

ANACOSTIA WATERSHED TRASH SURVEY (Cont'd)

STATION NO. : _____

Total Weight: _____ (Check if applicable)

DATE : _____

Less Container Weight: _____ (Check if applicable)

	Trash Item	Field Count		Number of Items (Sub-total)	Optional Weight ()
		Carry Out	Other		
1	Plastic Bags				
2	Plastic Bottles				
3	Glass Bottles				
4	Aluminum Cans				
5	Styrofoam (cups, packaging, etc.) 10 peanuts = 1	Expanded Polystyrene	Other		
6	Paper (newspapers, magazines, etc.)				
7	Cardboard				
8	Cloth/Clothing/Carpeting				
9	Food Packaging				
10	Auto :				
	Oil Quart Containers				
	Oil Filters				
	Antifreeze Containers				
	Body Parts: Large >1 ft ²				
	Small <1 ft ²				
11	Car Batteries				
12	Tires (cars, trucks)				
13	Construction Debris :				
	Bricks (>1/2 brick)				
	Concrete				
	Lumber				
	Misc. (e.g. drywall, etc.)				
14	Appliance(s)				
15	Wooden Pallets				
16	Metal (Drums, Cans, Pipes)				
17	Shopping Carts				
18	Toiletries/Drug Containers				
19	Sports Equipment/Toys				
20	Miscellaneous				
TRASH TOTAL					
DEBRIS SUBTOTAL				Total	
TOTAL WEIGHT					

Container Weight =

of Strainers =

Montgomery County: Anacostia Trash TMDL Monitoring-Related Efforts FY18 Technical Memorandum Final



Prepared For:
**Montgomery County Department of Environmental
Protection**

Prepared By:
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Groat, Aubin Maynard**

**Metropolitan Washington Council of Governments
Department of Environmental Programs**

June 2018

Acknowledgements

The authors would like to take this opportunity to thank several individuals for their many contributions to this project. First and foremost, we would like to thank the Montgomery County Department of Environmental Protection (MCDEP) for providing the financial support necessary for making this project possible. Furthermore, we wish to especially thank MCDEP staff Ms. Amy Stevens, Ms. Leslie Wilcox and Ms. Katherine Bennett for providing technical coordination and guidance. We also wish to thank M-NCPPC staff for coordinating park site access and providing data for clean up events. Finally, the authors thank Mr. Steven Bieber and Mr. Steven Walz (both COG) for providing their support during the course of the project.

TABLE OF CONTENTS

Project Background	1
Task 1 - Annual Stream-Level Trash Monitoring	2
FY18 Summary of Findings	2
Recommendations.....	11
References.....	12
Attachment A: Station Information and Coordinate Location.....	13
Attachment B: Field Data Sheet.....	14
Attachment C: Figure 1 - Total Top Five Trash Categories	16
Attachment C: Figure 2 - Percent Total of Top Five Trash Categories	17

LIST OF FIGURES

Figure 1. COG staff surveying Little Paint Branch (LPLP301A)	1
Figure 2. Strainer in Northwest Branch mainstem (NWNW407D).....	1
Figure 3. Trash along the bankfull area in Sligo Creek (SCLB101).....	1
Figure 4. Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites).....	4
Figure 5. FY18 Count Survey - Percent Count Distribution	6
Figure 6. "Pick Sites" Summary - Pounds Removed Per Site (2011 - 2018).....	8
Figure 7. FY18 "Pick Sites" Survey - Percent Weight Distribution.....	9
Figure 8. 2017-2018 Rainfall Data-Monthly Total for DCA and BARC	10

LIST OF TABLES

Table 1. ATRW's Stream Trash Survey Index	2
Table 2. Stream Survey Sampling Results Fall 2017	5
Table 3. Stream Survey Sampling Results Spring 2018	5
Table 4. Stream Survey: Average Monthly Trash Accumulation (lbs per Month) 2011 - 2018.....	7
Table 5. September 2017 "Pick Sites" - Weight of Selected Items.....	7
Table 6. June 2018 "Pick Sites" - Weight of Selected Items.....	7

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As such, two major tasks were completed for this 12 month long project and are as follows:

- Task 1: Annual Stream-Level Trash Monitoring; and
- Task 2: Technical Memorandum Development

This technical memorandum will highlight results from Task 1.



Figure 1. COG staff surveying Little Paint Branch (LPLP301A)



Figure 2. Strainer in Northwest Branch mainstem (NWNW407D)



Figure 3. Trash along the bankfull area in Sligo Creek (SCLB101)

Task 1: Annual Stream-Level Trash Monitoring

COG completed the Anacostia tributary trash surveying protocol using the MDE-approved field data sheet (Attachment A) to catalogue trash in 15 stream sites (Figure 4). This in-stream trash survey was performed two times within the fiscal year 2018 (i.e., July 2017 through June 2018 (FY18)). The “count” surveys were conducted in September 2017 and June 2018. At each site, the total number of trash items within a 500 foot long stream reach was recorded and catalogued according to the 20-plus MDE trash items. It should be noted that as a result of the Montgomery County Carryout Bag Law and ban on expanded polystyrene food service ware and loose fill packaging, COG now separates out “carryout bags” and “expanded polystyrene”, which will help identify possible trends in those items due to legislation implementation. COG has also started to separate “straws” from the “food packaging” trash category in order to collect baseline preliminary data on straws. Count survey summary data are shown as number of items per 100 feet (e.g., no. items/100 ft) and the percent category distribution. Table 1 represents the 1998 Anacostia Trash Reduction Workgroup’s (ATRW) stream trash survey index, which provides a standardized verbal ranking for the number of trash items per one hundred feet.

In addition to cataloguing the trash, COG removed and weighed trash items from the upstream 250 feet of the 500 foot long survey reach at five of the 15 sites. By removing and weighing the trash at these “pick sites”, COG is able to generate a reasonable estimate of instream trash accumulation rates between survey periods. Also, in keeping with the 2008-9 survey methodology, precipitation data were obtained from the two nearest weather stations. This information was summarized from the Washington National Airport (DCA) and the USDA Beltsville Agricultural Research Center (BARC).

As previously mentioned, the FY18 trash survey was performed twice; in September 2017, and June 2018, respectively. Figure 4 highlights the 15 station locations and Attachment A, Table 1 provides the general site information.

Table 1. Anacostia Trash Reduction Workgroup’s Stream Trash Survey Index

Trash Index	
Verbal Ranking	No. Items/100 ft.
None - Very Light	0 - 10.0
Light	10.1 - 25.0
Moderate	25.1 - 50.0
High	50.1 - 100.0

FY18 Survey Summary of Findings

- Table 2 and table 3 summarize the fall 2017 and spring 2018 surveys, respectively. In fall 2017 there were ten sites with “Very Light” or “Light” trash ratings. In spring 2018, there were also ten sites with “Very Light” or “Light” trash ratings; however, they were not the same sites in both surveys. In spring 2018, PBHB210 increased from “Light” to “Moderate” due to an existing rootwad/strainer collecting plastic bottles and other floatable trash items. LPLP202 increased from “Very Light” to “Light”. LPLP109 decreased from “Moderate” in fall 2017 to “Light” in spring 2018. LPLP201A has decreased from “Light” to “Very Light” in spring 2018, possibly related to the removal of a strainer (tree fall). PBSA100 remains the only site with a “High” verbal trash ranking for both survey periods.
- Figure 5 summarizes the FY18 count surveys’ top five trash categories as a percentage of the total number of items. Food packaging, plastic bottles, plastic bags, carryout plastic bags, and miscellaneous items are in the order of highest to lowest percent of the total and comprise 68 percent of the total items counted. The reader is referred to Attachment A (e.g., the COG trash data sheet) for the list of trash items and Attachment B Figure 1 and Attachment C Figure 2 for historical bar graphs for the top 5 trash items.
- Table 4 shows the monthly trash accumulation rate by weight for the five “pick sites” since the 2011 summer survey. PBSA100 has the highest level of trash accumulation for both fall 2017 and spring 2018. PBSA100’s 11.82 fall accumulation rate was the highest level that has been calculated. At this site, the spring 2018 accumulation rate dropped to 3.40. It should be noted that PBSA100’s spring

2018 pick survey was conducted after two trash clean up events (03/08/2018, 04/14/2018). NWN-W407D has the second highest monthly accumulation rate. The large tree fall continues to collect floatable trash items, but has also now created a larger side channel where trash and other debris can flow downstream. Figure 6 graphically summarizes Table 4 for the pounds of trash removed from each site over 15 surveys. Interestingly for NWNW407D, the large tree fall, that was first documented in the 2014 survey, extended across the entire channel width. In recent years, the side channel has formed allowing trash and other debris to flow downstream. Since the summer 2016, this strainer has become less efficient at collecting trash.

- Tables 5 and 6 highlight the weight of selected trash items at the “pick sites” for the fall 2017 and spring 2018 surveys. Expanded polystyrene has the lowest weight among these selected items for both surveys. Carryout plastic bags and plastic bag others have the highest and second highest weight in fall 2017, respectively. In the spring 2018 survey, carryout plastic bags and plastic bottles have the highest weight, respectively.
- Figure 7 shows the FY18 “pick sites” surveys’ top five items based on weight. Carryout plastic bags, plastic bag others, plastic bottles, cloth/carpeting/clothing and miscellaneous items are listed in the order of highest to lowest percent of total and comprise 72 percent of the total FY18 weight. The reader is reminded that the “pick” survey measures the total wet weight for each trash category.
- Figure 8 shows monthly total rainfall at DCA and BARC weather stations. The rainfall levels were consistent between sites, except for October 2017 when there was more rainfall at the BARC rain gauge. May, July, August of 2017 and February, April and May of 2018 monthly precipitation totals at both sites were higher than the monthly mean at Washington National Airport.

Figure 4. Montgomery County Anacostia Tributary Trash Monitoring Station Network (15 sites)

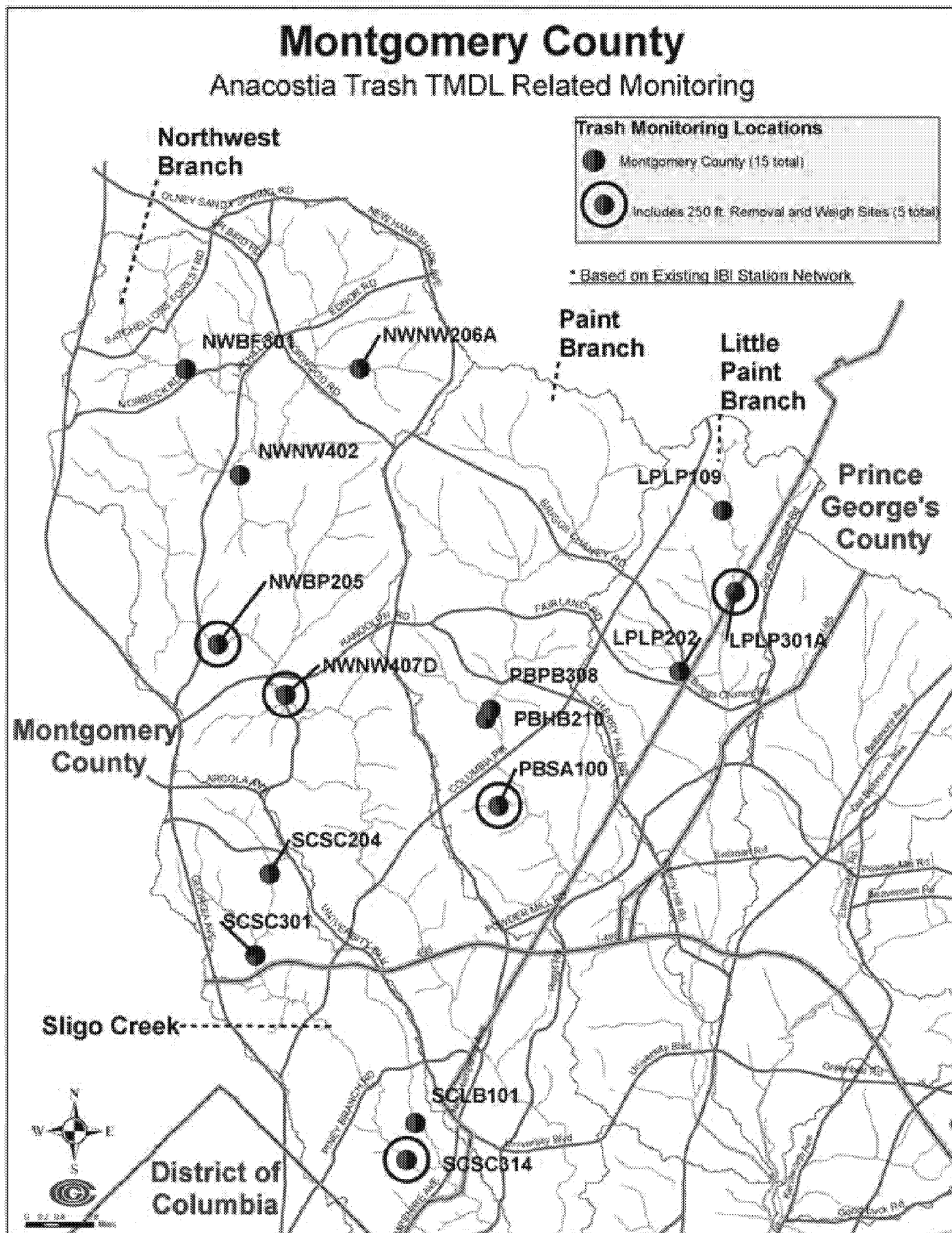


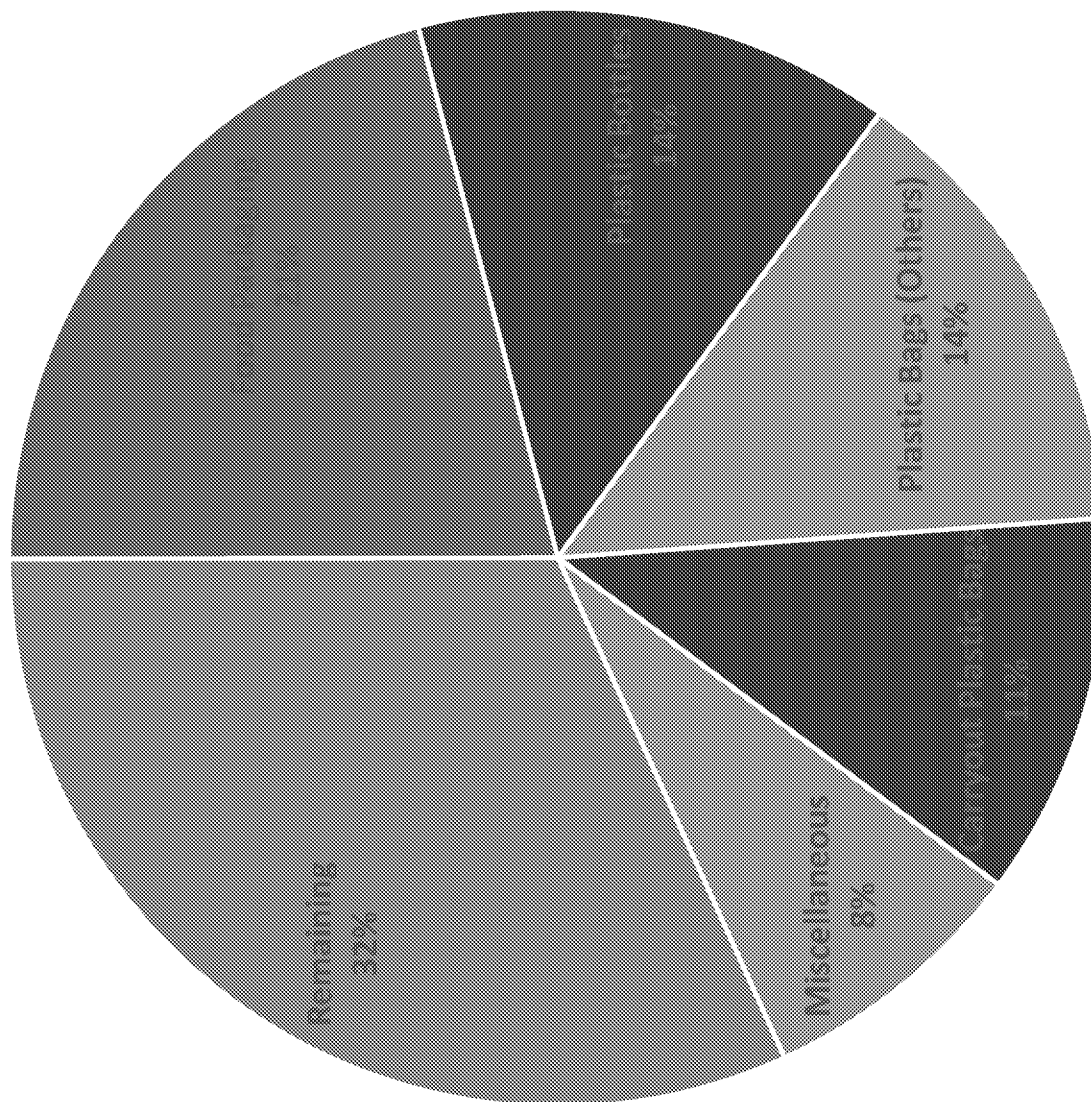
Table 2. Stream Survey Sampling Results Fall 2017

Site ID	Station Name	Subwatershed	Total Number of Items	Mean No. of Trash Items Per 100ft	Verbal Ranking	Strainers
SCLB101	Long Branch	Sligo Creek	165	33.0	Moderate	0
SCSC204	University Blvd	Sligo Creek	44	8.8	Very Light	0
SCSC301	Forest Glen Rd	Sligo Creek	77	15.4	Light	0
SCSC314	Carroll Avenue	Sligo Creek	140	28.0	Moderate	0
NWBP205	Bel Pre Creek	Northwest Branch	119	23.8	Light	1
NWNW206A	Bryant's Nursery Run	Northwest Branch	20	4.0	Very Light	2
NWBF301	Batchellors Run	Northwest Branch	123	24.6	Light	0
NWNW402	Layhill Park	Northwest Branch	40	8.0	Very Light	2
NWNW407D	Kemp Mill Rd	Northwest Branch	128	25.6	Moderate	6
PBHB210	Hollywood Branch	Paint Branch	78	15.6	Light	2
PBPB308	Valley Mill Park	Paint Branch	14	2.8	Very Light	2
PBSA100	Stewart April Lane	Paint Branch	696	139.2	High	4
LPLP109	Fairland Regional Park (north)	Little Paint Branch	149	29.8	Moderate	1
LPLP202	Briggs Chaney Rd	Little Paint Branch	10	2.0	Very Light	0
LPLP301A	Fairland Regional Park (central)	Little Paint Branch	73	14.6	Light	4

Table 3. Stream Survey Sampling Results Spring 2018

Site ID	Station Name	Subwatershed	Total Number of Items	Mean No. of Trash Items Per 100ft	Verbal Ranking	Strainers
SCLB101	Long Branch	Sligo Creek	196	39.2	Moderate	1
SCSC204	University Blvd	Sligo Creek	41	8.2	Very Light	3
SCSC301	Forest Glen Rd	Sligo Creek	52	10.4	Light	1
SCSC314	Carroll Avenue	Sligo Creek	150	30.0	Moderate	0
NWBP205	Bel Pre Creek	Northwest Branch	116	23.2	Light	0
NWNW206A	Bryant's Nursery Run	Northwest Branch	29	5.8	Very Light	3
NWBF301	Batchellors Run	Northwest Branch	125	25.0	Light	2
NWNW402	Layhill Park	Northwest Branch	39	7.8	Very Light	1
NWNW407D	Kemp Mill Rd	Northwest Branch	159	31.8	Moderate	1
PBHB210	Hollywood Branch	Paint Branch	164	32.8	Moderate	1
PBPB308	Valley Mill Park	Paint Branch	19	3.8	Very Light	0
PBSA100	Stewart April Lane	Paint Branch	562	112.4	High	5
LPLP109	Fairland Regional Park (north)	Little Paint Branch	115	23.0	Light	2
LPLP202	Briggs Chaney Rd	Little Paint Branch	77	15.4	Light	2
LPLP301A	Fairland Regional Park (central)	Little Paint Branch	40	8.0	Very Light	2

Figure 5. FY18 Count Survey - Percent Count Distribution¹



¹ Food packaging includes straws; "Remaining" includes all trash categories not including the top five trash categories

Table 4. Stream Survey: Average Monthly Trash Accumulation (lbs per Month) 2011 - 2018

Site Name	Site ID	Monthly Trash Accumulation (lbs per Month)														
		Summer 2011 (June, July, Aug)	Fall 2011 (Oct)	Summer 2012 (July)	Fall 2012 (Oct, Dec)	Summer 2013 (June)	Fall 2013 (Sept- Oct)	Summer 2014 (June- July)	Fall 2014 (Oct)	Summer 2015 (July)	Fall 2015 (Oct)	Summer 2016 (June)	Fall 2016 (Oct)	Spring 2017 (April- May)	Fall 2017 (Sept)	Spring 2018 (June)
Carroll Avenue	SCSC314	1.0	3.3	1.1	1.0	1.2	1.2	1.1	1.6	0.9	1.5	0.85	2.47	0.96	0.88	1.99
Bel Pre Creek	NWBP205	6.0	1.1	1.3	1.6	0.9	1.3	2.4	0.8	1.3	1.2	1.35	1.96	1.70	2.90	1.12
Kemp Mill Road	NWNNW407D	2.2	1.2	1.6	0.3	1.0	1.3	5.5	7.8	5.6	5.9	5.39	3.12	1.76	3.11	2.11
Stewart April Lane	PBSA100	9.1	4.4	3.8	5.6	5.3	6.2	6.3	5.1	2.8	3.6	3.17	7.80	7.08	11.82	3.40
Fairland Regional Park	LPLP301A	1.6	1.1	0.2	0.1	0.3	1.3	0.5	0.2	0.6	1.3	0.51	0.18	0.40	0.64	0.30

Table 5. September 2017 "Pick Sites" - Weight of Selected Items

Site ID	Site Name	Total Number of Items	Weight of Carryout Plastic Bags (lbs.)	Weight of Plastic Bags (Other) (lbs)	Weight of Expanded Polystyrene (lbs)	Weight of Plastic Bottles (lbs)	Total Weight (lbs)	Monthly Accumulation (lbs per month)
SCSC314	Carroll Ave.	36	1.76	0.44	0.00	0.84	3.5	0.88
NWBP205	Bel Pre Creek	56	4.41	0.88	0.04	0.07	11.6	2.90
NWNNW407D	Kemp Mill Rd.	61	0.22	1.32	0.44	2.65	12.4	3.11
PBSA100	Stewart April Ln.	684	9.70	9.92	0.87	5.18	47.3	11.82
LPLP301A	Fairland Regional (Central)	34	0.44	0.33	0.06	1.43	2.6	0.64

Table 6. June 2018 "Pick Sites" - Weight of Selected Items

Site ID	Site name	Total Number of Items	Weight of Carryout Plastic Bags (lbs)	Weight of Plastic Bags (Other) (lbs)	Weight of Expanded Polystyrene (lbs)	Weight of Plastic Bottles (lbs)	Total Weight (lbs)	Monthly Accumulation (lbs per month)
SCSC314	Carroll Ave.	63	3.97	0.11	0.04	3.09	17.9	2.0
NWBP205	Bel Pre Creek	69	0.20	1.54	0.00	2.09	10.1	1.1
NWNNW407D	Kemp Mill Rd.	119	2.65	3.97	0.33	5.05	19.0	2.1
PBSA100	Stewart April Ln.	503	8.58	4.59	0.57	2.82	30.6	3.4
LPLP301A	Fairland Regional (Central)	35	0.11	0.44	0.07	1.01	2.7	0.3

Figure 6. "Pick Sites" Summary - Pounds Removed Per Site (2011 - 2017)

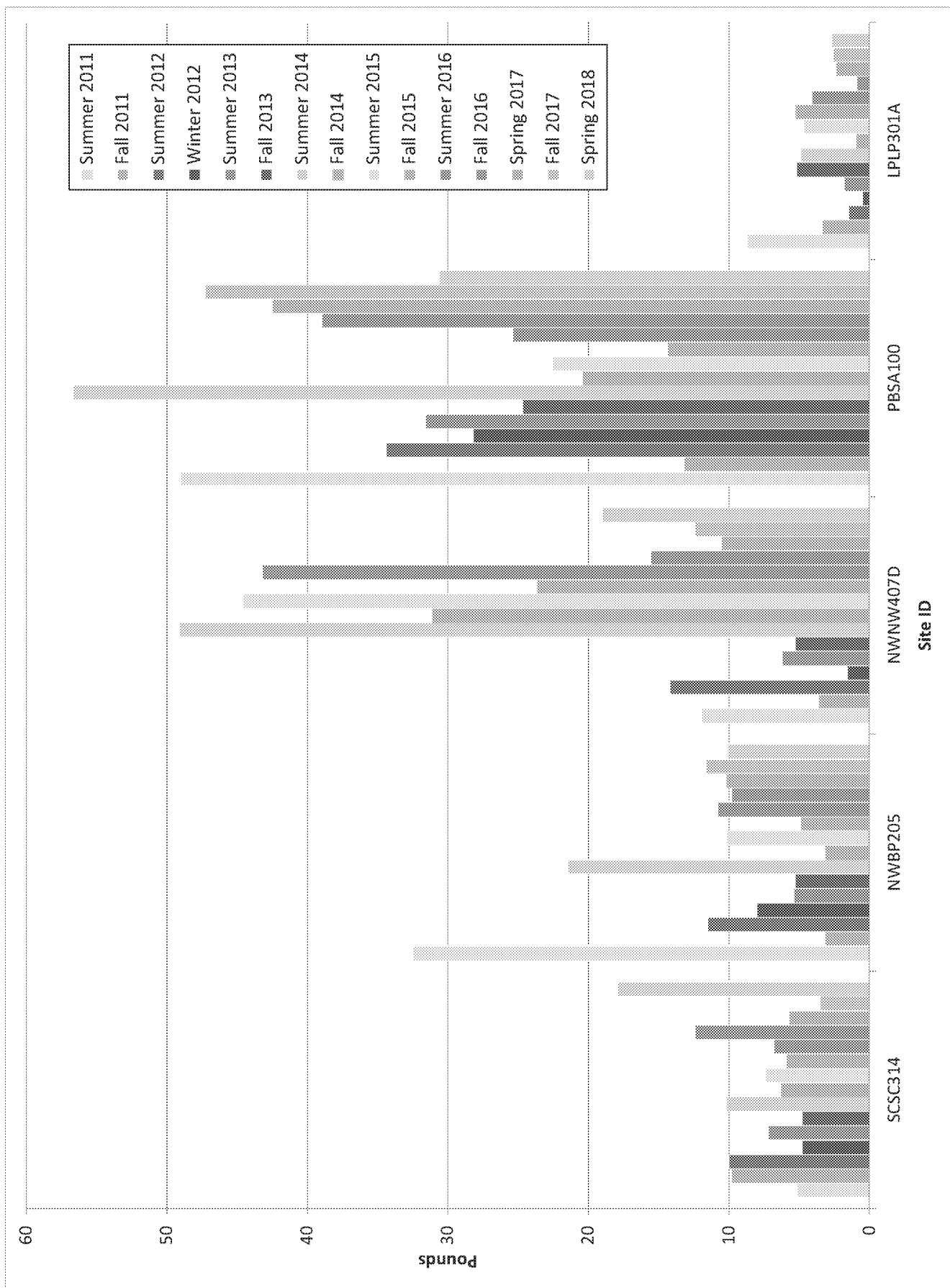
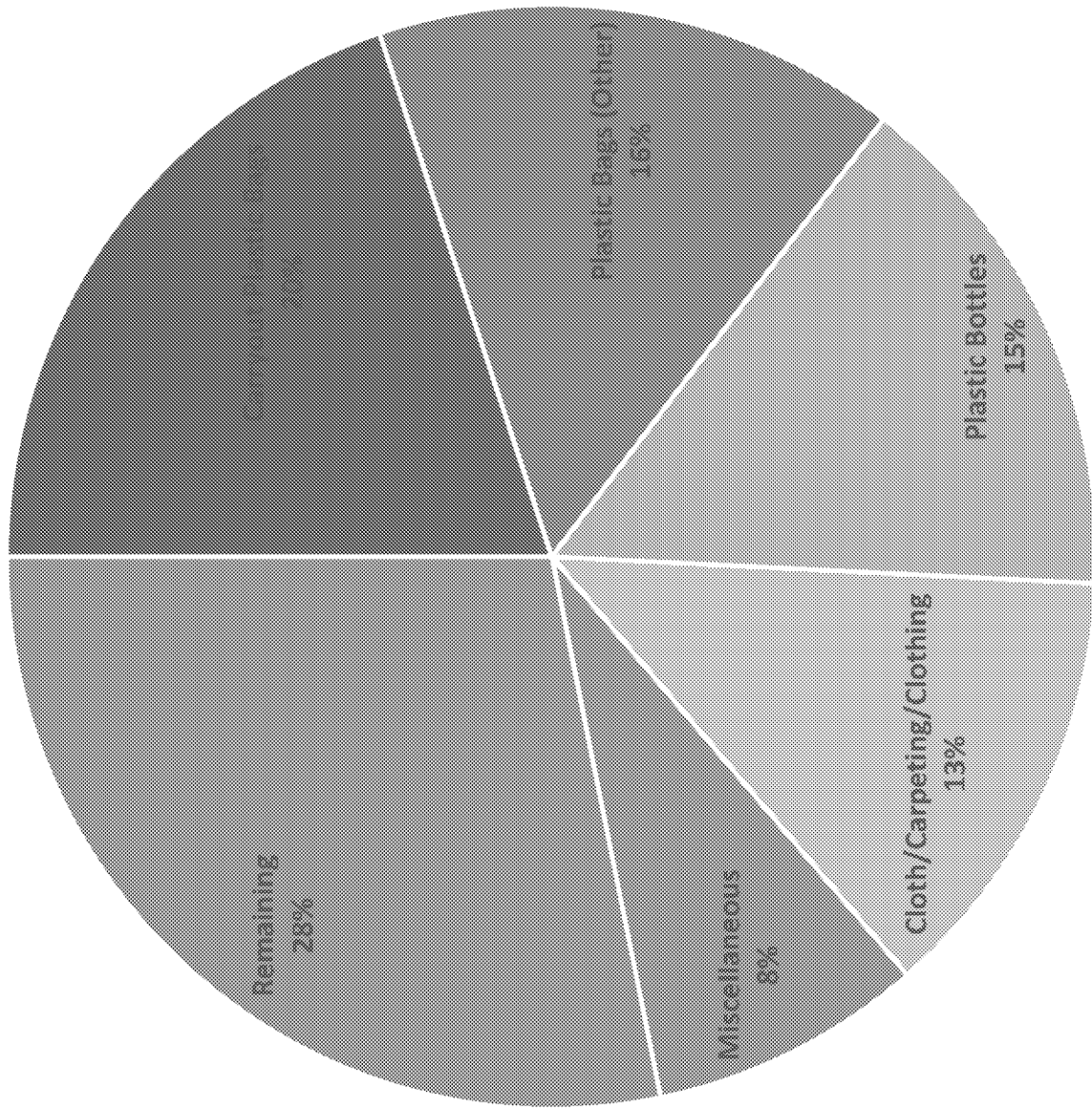
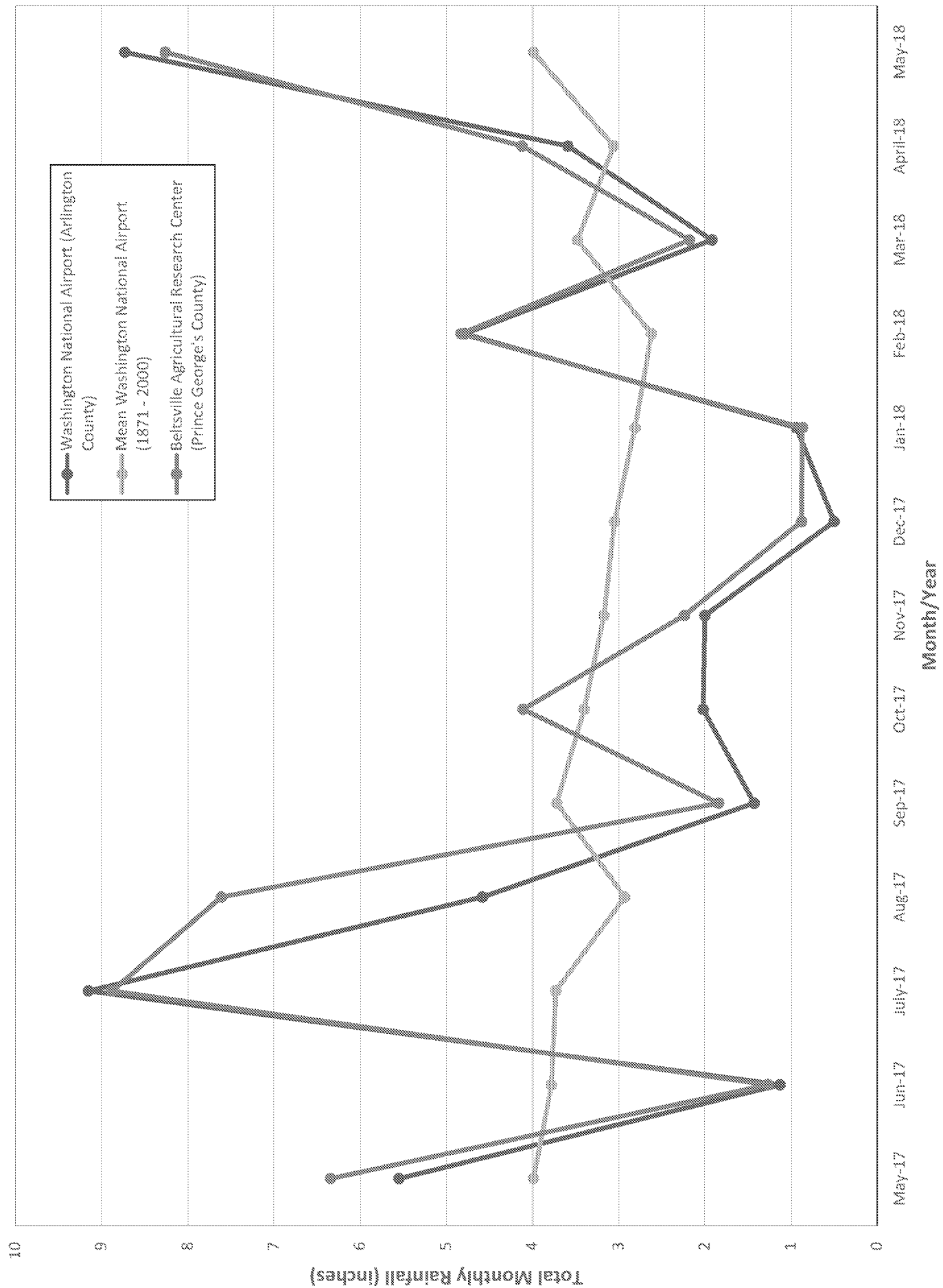


Figure 7. FY18 "Pick Sites" Survey - Percent Weight Distribution¹



¹ Food packaging includes straws; "Remaining" includes all trash categories not including the top five trash categories

Figure 8. 2017-2018 Total Monthly Rainfall Data for DCA and BARC Stations



Recommendations:

Annual Stream-Level Trash Surveying:

- MCDEP should consider continuing the MDE-approved Anacostia Tributary trash surveying protocol at the fifteen 500 foot long existing stream trash survey sites through 2019. This would provide long-term trends in stream trash condition data. It will also provide insight into the efficacy of the 2012 carryout plastic bag law and provide additional baseline information for polystyrene prior to targeted implementation of the January 2016 selected polystyrene product ban. Continuing the survey could provide baseline data on the number of straws in the watershed.
- MCDEP should consider continuing to survey the existing five 250 foot long “pick” sites to provide the long-term trend accumulation rates. This generates long-term trash accumulation rates as it may relate to the following: local rainfall data, land use, upstream imperviousness, number of strainers and trash reduction activities.
- COG recommends that MCDEP identify areas where trash and litter hots spots and illegal dumping frequently occur.
- MCDEP should work with M-NCPPC to identify and remove major tree falls that are acting as trash strainers and creating areas of severe bank erosion. The tree fall at NWNW407D would be a good candidate for such an action as our surveys have seen dramatic increases in floatables caught in the branches and associated debris at this site since 2014. PBSA100 also has several large tree falls that acts as a strainer within the stream.

References

Maryland Department of the Environment (MDE) and District of Columbia, Department of Environment (DDOE). 2010. Total Maximum Daily Loads of Trash for the Anacostia River Watershed, Montgomery and Prince George's Counties, Maryland and The District of Columbia - Draft. Submitted to EPA (U.S. Environmental Protection Agency). Baltimore, MD.

Metropolitan Washington Council of Governments (COG). 2009. Anacostia Trash TMDL-Related Baseline Conditions Monitoring (June 2008 – July 2009). Prepared for Montgomery County Department of Environmental Protection and Prince George's County Department of Environmental Resources. Washington, DC.

Metropolitan Washington Council of Governments (COG). 2009. Anacostia Trash TMDL, Work/Quality Assurance Project Plan. Prepared for Montgomery County Department of Environmental Protection and Prince George's County Department of Environmental Resources. Washington, DC.

Attachment A: Table 1 - Station Information and Coordinate Location

Site ID	Site Name	Subwatershed	Latitude	Longitude
SCLB101	Long Branch	Sligo Creek	38.988901	-76.997278
SCSC204	University Boulevard	Sligo Creek	39.032203	-77.029887
SCSC301	Forest Glen Road	Sligo Creek	39.018017	-77.033120
SCSC314*	Carroll Avenue	Sligo Creek	38.982507	-76.999326
NWBP205*	Bel Pre Creek	Northwest Branch	39.072065	-77.041530
NWNW206A	Bryant's Nursery Run	Northwest Branch	39.119944	-77.009675
NWBF301	Batchellors Run	Northwest Branch	39.119873	-77.048719
NWNW402	Layhill Park	Northwest Branch	39.101439	-77.036622
NWNW407D*	Kemp Mill Road	Northwest Branch	39.063277	-77.026360
PBHB210	Hollywood Branch	Paint Branch	39.059098	-76.981635
PBPB308	Valley Mill Park	Paint Branch	39.060755	-76.980538
PBSA100*	Stewart April Lane	Paint Branch	39.044059	-76.978687
LPLP109	Fairland Regional Park (north)	Little Paint Branch	39.095274	-76.928558
LPLP202	Briggs Chaney Road	Little Paint Branch	39.067311	-76.938244
LPLP301A*	Fairland Regional Park (central)	Little Paint Branch	39.081100	-76.925776
*Indicates a "pick survey" site performed from the upstream 250 feet of the 500 foot reach				

Attachment B: Field Data Sheet

ANACOSTIA WATERSHED TRASH SURVEY – MDE 8 Digit Watershed Code - 02140205

DATE: _____ START TIME: _____
 CREW: _____ END TIME: _____

SUBWATERSHED:									
STATION NUMBER:									
STATION NAME:									
STARTING COORD. (DDMMSS):		Lat:		Long:					
END COORD. (DDMMSS):		Lat:		Long:					
SURVEY TYPE (check applicable)									
1. Stream		Length (ft):							
		No. of Trash "Strainers":							
		Riparian Buffer Conditions:							
2. Trash Netting System		Net Number and Total Weight (lbs)							
Total Number of Nets/ Nets Surveyed		1	2	3	4	5	6	7	8
3. Road Right of Way		300' long and 5' wide on either side of curb gutter per side							
4. Stormwater Management Pond									
5. Storm Drain Outfall (Trash Fence)		DA (Acres/mi ²) =							
GENERAL LAND USES (check all applicable)									
• Low Density Residential (large lot, single family)									
• Medium Density Residential (small lot, single family, and/or townhouses)									
• High Density Residential (apartments)									
• Commercial									
• Industrial									
• Institutional (libraries, schools, religious)									
• Recreational Area (developed)									
• Forest									
• Agriculture									
GENERAL STATION DESCRIPTION:									
PHOTO NUMBERS:									
TOTAL NO. OF OBSERVED ITEMS:									
TOP THREE ITEMS AND ASSOCIATED SUB-TOTALS:									
TOTAL WEIGHT (OPTIONAL):		(lbs)							

ANACOSTIA WATERSHED TRASH SURVEY (Cont'd)

STATION NO. : _____

Total Weight: _____ (Check if applicable)

DATE : _____

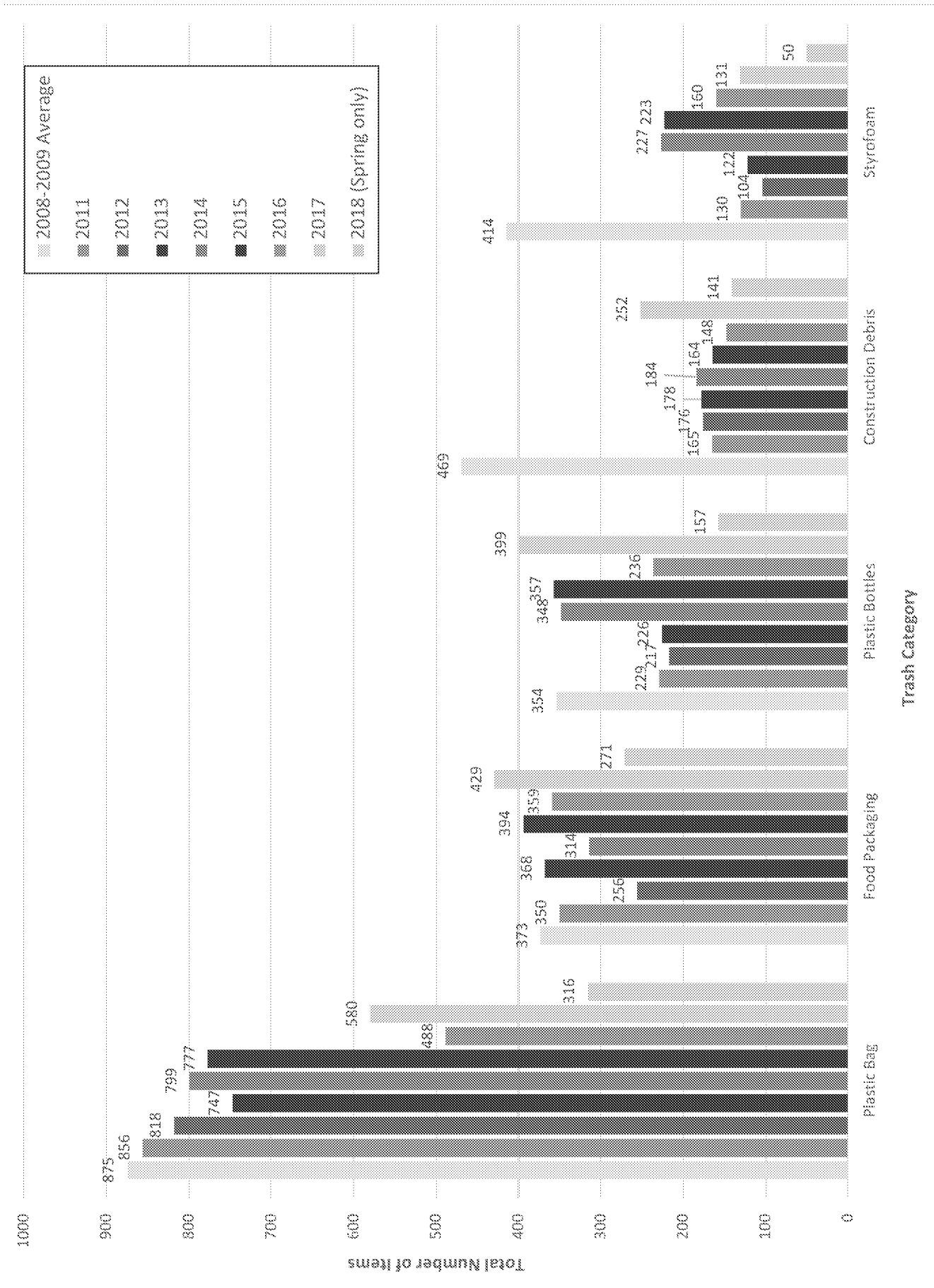
Less Container Weight: _____ (Check if applicable)

	Trash Item	Field Count		Number of Items (Sub-total)	Optional Weight ()
		Carry Out	Other		
1	Plastic Bags				
2	Plastic Bottles				
3	Glass Bottles				
4	Aluminum Cans				
5	Styrofoam (cups, packaging, etc.) 10 peanuts = 1	Expanded Polystyrene	Other		
6	Paper (newspapers, magazines, etc.)				
7	Cardboard				
8	Cloth/Clothing/Carpeting				
9	Food Packaging				
10	Auto :				
	Oil Quart Containers				
	Oil Filters				
	Antifreeze Containers				
	Body Parts: Large >1 ft ²				
	Small <1 ft ²				
11	Car Batteries				
12	Tires (cars, trucks)				
13	Construction Debris :				
	Bricks (>1/2 brick)				
	Concrete				
	Lumber				
	Misc. (e.g. drywall, etc.)				
14	Appliance(s)				
15	Wooden Pallets				
16	Metal (Drums, Cans, Pipes)				
17	Shopping Carts				
18	Toiletries/Drug Containers				
19	Sports Equipment/Toys				
20	Miscellaneous				
TRASH TOTAL					
DEBRIS SUBTOTAL				Total	
TOTAL WEIGHT					

Container Weight =

of Strainers =

Attachment C: Figure 1 - Stream Summary - Top Five Trash Categories (PBSA100 not included)



Attachment C: Figure 2 - Stream Summary - Percent Total of Top Five Trash Categories

